modern castings

Owned by the men who Buy

APRIL 1956
OFFICIAL PROGRAM ISSUE

future meetings and exhibits

APRIL

3 . . Material Handling Institute, *Edgewater Beach Hotel, Chicago. Spring Meeting.*

12-13 . . Malleable Founders' Society, *Edgewater Beach Hotel, Chicago. Seventh Market Development Conference.*

18-19 . . Armour Research Foundation, Illinois Institute of Technology, *Hotel Sherman, Chicago. National Industrial Research Conference.*

27 . . Malleable Founders' Society, *Drake Hotel, Chicago. Western Section Meeting.*

MAY

3 . . Non-Ferrous Founders' Society, *Atlantic City, N. J. Annual Membership Meeting.*

3-9 . . American Foundrymen's Society, *Convention Hall, Atlantic City, N. J. 60th Annual Castings Congress and Show.*

4 . . American Association of Spectrographers, *Chicago. 7th Annual Conference.*

8-11 . . American Welding Society, *Buffalo, N. Y. Spring Meeting & Fourth Welding and Allied Industry Exposition.*

10-11 . . Refractories Institute, *Grand Hotel, Point Clear, Ala. Annual Meeting.*

11 . . Malleable Founders' Society, *Hotel Commodore, New York. Eastern Section Meeting.*

20-23 . . Industrial Heating Equipment Association, *The Homestead, Hot Springs, Va. Spring Meeting.*

21-24 . . Air Pollution Control Association, *Buffalo, N. Y. 1956 Niagara Frontier Annual Meeting.*

JUNE

4-8 . . American Foundrymen's Society, *LaSalle Hotel, Chicago. Technical Committee Week.*

5-8 . . Materials Handling Institute. *Public Auditorium, Cleveland. Materials Handling Exposition.*

6 . . American Foundrymen's Society, *LaSalle Hotel, Chicago. Technical Council.*

11-12 . . Malleable Founders' Society, *The Homestead, Hot Springs, Va. General Society Meeting.*

14-16 . . American Foundrymen's Society, *Kellog Center, Michigan State University, East Lansing, Mich. Education Seminar.*

17-22 . . American Society for Testing Materials, *Chalfonte-Haddon Hall, Atlantic City, N. J. 59th Annual Meeting.*

24-26 . . Alloy Casting Institute, *The Homestead, Hot Springs, Va. Annual Meeting.*

28-29 . . American Foundrymen's Society, *LaSalle Hotel, Chicago. 13th Annual Chapter Officers' Conference.*

SEPTEMBER

1-9 . . International Foundry Trades Fair and 23rd International Foundry Congress, *Dusseldorf, Germany. Hosts: Association of German Foundrymen, Industrial Association of the Foundry Industry, Foundry Machinery Trade Association, and Joint Association of German Metal Foundries.*

11-13 . . American Die Casting Institute, *Edgewater Beach Hotel, Chicago. Annual Meeting.*

17-21 . . Instrument Society of America, *New York Coliseum, New York. 11th Annual Instrument-Automation Conference & Exhibit.*

24-25 . . Steel Founders' Society of America, *The Greenbrier, White Sulphur Springs, W. Va. Fall Meeting.*

24-26 . . Material Handling Institute. *The Greenbrier, White Sulphur Springs, W. Va. Fall Meeting.*

25-28 . . Association of Iron and Steel Engineers, *Public Auditorium, Cleveland. Iron and Steel Exposition.*

OCTOBER

4-5 . . Magnesium Association, *Drake Hotel, Chicago. Annual Meeting.*

11-12 . . National Foundry Association, *Detroit. Annual Meeting.*

11-12 . . Armour Research Foundation, Illinois Institute of Technology, *Hotel Sherman, Chicago. National Noise Abatement Symposium.*

18-20 . . Foundry Equipment Manufacturers' Association, *The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.*

29-30 . . Refractories Institute, *The Homestead, Hot Springs, Va. Fall Meeting.*

30-Nov. 2 . . Gray Iron Founders' Society, *The Homestead, Hot Springs, Va. Annual Meeting.*

NOVEMBER

7-9 . . Steel Founders' Society of Ameri-

ca, *Carter Hotel, Cleveland. Technical & Operating Conference.*

8-9 . . All-Canadian Foundry Conference, *Mount Royal Hotel, Montreal, Que. Sponsored by Eastern Canada and Ontario Chapters of the American Foundrymen's Society.*

29-30 . . Michigan Regional Foundry Conference, *University of Michigan, Union Bldg., Ann Arbor, Mich. Sponsored by the Detroit, Saginaw Valley, Central Michigan, and Western Michigan Chapters and the University of Michigan and Michigan State University Student Chapters of the American Foundrymen's Society.*

AFS Steel Group Winds Up Research

An investigation into the addition of solid deoxidizers to molten steel by injection is being brought to a conclusion by the Steel Division of the American Foundrymen's Society.

The research work began in early 1955 with a study of the effects of various types of gaseous flushing agents. The experimental work utilized three variations of injection practice: gas flush only, gas flush in combination with deoxidizer, and addition of the deoxidizer by hand.

Six different deoxidizer alloys were used. The compounds were: calcium-silicon plus aluminum, calcium-aluminum-silicon plus aluminum, cerium-magnesium-ferrosilicon plus aluminum, cerium-calcium-silicon plus aluminum, graphite compound plus aluminum and calcium-manganese-silicon plus aluminum.

The research committee has drawn the following tentative conclusions:

- The addition of deoxidizers by gas does not give conclusively better results in improving strength or reduction of area values.
- The six deoxidizers tested were not conclusively superior to the usual calcium manganese-silicon plus aluminum secondary hard addition.
- Charpy "V" notch impact values showed inconclusive results.
- Aluminum recovery was lower with gas injection than with hand additions in practically all cases.

CIRCLE NO. 112, PAGE 115-116

april, 1956
vol. 29, no. 4

modern castings

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TIPS, TRENDS AND TECHNIQUES

As the first robin announces the advent of spring, this first in the series of three special convention issues of MODERN CASTINGS announces that it is convention time again. This is the *Official Program Issue* and if you will open the magazine to page 51 that is just what you will find, the *Official Program*. You can take it out of the magazine and use it in planning your schedule at Atlantic City where you will be given a copy of the program's final edition.

■ There is plenty of room for excellent technical material in this big issue of the casting industry's favorite magazine. The second of two great articles on sand testing is on page 78. This one *"New Test For Better Molding Practice,"* is a follow-up on *"Does Sand Testing Give Us The Facts?"*

■ Every month, *Foundry Facts* provides a file page of valuable information and this month is no exception as the page features an analytical sequence which will furnish a chemical analysis of any ferrous metal in 45 minutes.

■ Cast magnesium in plaster? You certainly can. Just turn to page 84 and read how it has been done by Alcoa.

■ If you are looking for a good man, or if you are a good man looking for a good job, turn to page 126 and take a look at the classified ads. They say that the results from our classified are downright marvelous.

■ Meetings of local chapters are the heart of AFS program. Check the listings of chapter meetings on page 124 and don't miss out on the programs of your near-by group.

■ In May . . . "The Foundry of Tomorrow"—next month's Bonus Section will portray the foundry of the near as well as the distant future . . . Exhibitors List in buyers guide form keyed to huge two-page, two-color exhibit hall floor plan . . . blow-hot press . . . automatic shell mold making . . . snotters . . . basic cost concepts . . . spinning metal molds . . . sulphur as an alloy, not an impurity . . . epoxy resin patterns . . . carbon arc-compressed air pad washing . . . air furnace bottom service of refractories.

modern castings album

Drastic changes in auto castings are promised if centrifugally cast gray iron cylinder liner developed by Perfect Circle Corp. comes into use. Blocks can be cast of softer iron or light metal when liner is used.

To "Know Your Area Foundries" seemed a good idea to AFS Central Illinois Chapter, so they devoted a meeting to telling about their own operations. Above are Don Schmidt, International Harvester, and George Steimle, Caterpillar. In the photo at the right, Claude Wilson and Lawrence Knislinger join Kenneth Kessler, center, at his plant's display.

Infra-red heat energy from gas warms new plant of Huron Mfg. Co. Small heating units located near ceiling warm building by heating objects, not air. Gas fuel delivered through small perforated ceramic catalyst burns below surface of catalyst at 100 F, but energy comes out at 1650 F in wave lengths of 3 to 5 microns. 26 units heat 6400 sq ft in this new, all-steel, Huron, Ohio, pattern shop.

30 Castings May Tell Story

Thirty gray iron castings poured in shell molds by the Shell Molding Materials Testing Committee of the American Foundrymen's Society may help establish new practices and standards for shell molding.

Meeting at the General Motors Technical Center, Warren, Mich., the committee recently poured 30 castings in shells made from a tentative standard test pattern. This pattern is a semi-circle with a diameter of 8 in. and a thickness of 1 in. Two different coated sand mixtures were used, each mixture being invested five times at each of five investment periods. Members of the committee observed pouring temperatures, pouring times, shell thickness, shell defects and dimensional tolerances of the castings.

The committee reported that they found that more shell molds made with round grain sand cracked due to thermal shock than molds made with sub-angular sand. All of the molds bulged and all castings were oversize, the committee reported.

Milton likes to bring home samples of his work.

Start Evaluation of Binders for CO_2

Data necessary to establish tentative test procedures for evaluating sodium silicate bonded sands is now being collected by the Core Test Committee of the American Foundrymen's Society's Sand Division.

V. M. Rowell, Harry W. Dietert Co., Detroit, has been assigned to activate this program for evaluating binders for the CO_2 process.

products and processes

Hydraulic setting, castable refractories line is increased by Flint Cast 29 and 30. High strength 29 is for hearths, doors, and supported roofs,

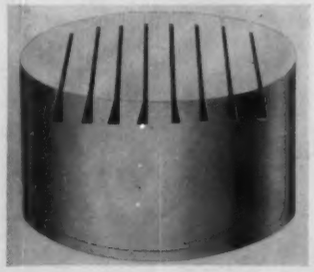
has service limit of 2900 F; medium strength 30 has limit of 3000. Available with heat stabilizers for 1300-2000 F range. Hardens without heat, does not expand, or shrink with drying. Shipped dry ready to mix. *Robinson Clay Products Co.*

CIRCLE NO. 1, PAGE 115-116

Induction heating line expanded to include 960, 3000, and 10,000-cycle low-frequency motor-generator units in sizes from 30 to 1250 kw; applications include melting. *Allis-Chalmers Mfg. Co.*

CIRCLE NO. 2, PAGE 115-116

Self-cleaning core vent for CO_2 process has taper-slots which diverge towards the underface. Krause vents are strengthened by a reinforcing ring



on the under face where they are concave for strength and to facilitate contouring. *Carver Foundry Products Co.*

CIRCLE NO. 3, PAGE 115-116

No. 500 Tens-A-Matic motor base automatically takes up belt stretch and absorbs starting loads, cuts belt-changing time to minutes, and elimi-

nates motor or belt realigning. For motors to 200 hp. *Murray Equip. Co., Inc.*

CIRCLE NO. 4, PAGE 115-116

Vacuum regulator, and breaker. "D-51" regulator for non-corrosive liquids and gases maintains lower vacuum in line than that from the source. "D-52" breaker limits maximum vacuum or holds a predetermined vacuum by admitting gases or liquids when slight changes in conditions occur. Range of 0 to 30" Hg; in pipe sizes ½" through 1¼". Bulletin 5-1. *A. W. Cash Valve Mfg. Corp.*

CIRCLE NO. 5, PAGE 115-116

Pre-built belt conveyor sections of Series 50 idlers for 18", 24", 30", and 36" belts in 24" and 42" deep truss frames. Drives range to 40 hp.

Conveyor changeover is minimized by rigidity, simplicity, and interchangeability of parts. Book 2579. *Link-Belt Co.*

CIRCLE NO. 6, PAGE 115-116

offers

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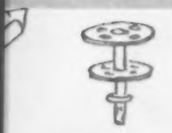

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THE CB5C FLEXIBLO

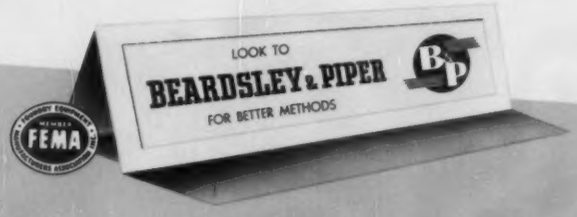
a new concept in bench core blowers

Here's how one foundry solved its small-core production problems

Few small jobbing foundries can afford to pass up the advantages of core blowing. Especially, now, that there is a small blower designed with full flexibility for all their needs. It's the new CB5C . . . the core blower designed with the small foundry in mind.

The CB5C quick change blow plate allows plate changes in seconds. . . means more core boxes can be handled. The new *push button* control automatically sequences the entire operation — there is no chance for error — just push a button and the job is done. An easily removable table clamp provides even more flexibility — all types of boxes may be handled on the new CB5C. Its capacity is 4½ pounds per blow.

At the Letz Manufacturing Company of Crown Point, Indiana, they've found the new CB5CD (the Letz machine is the full two-inch draw model) invaluable in handling a very wide range of small cores. Their new CB5CD, with an older B & P Champion CB 10, handles a very large portion of their small-core production. They have eliminated many of their core room production problems and their experience has shown that their blown cores are truer and more uniform. You can double or triple your production too — investigate now! Use the reader service card in this publication to request more information on the new CB5C or CB5CD (two inch draw model).



THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY

Hot material belts of Solarflex are made of special synthetic rubber which remains pliable and elastic af-

ter long periods of handling materials at 350 F. Solarflex is easily spliced. *B. F. Goodrich Co.*

CIRCLE NO. 7, PAGE 115-116

Masonry saw for wet or dry cutting has head adjustable to fraction of an inch over 20" range. All adjustments are at saw front. Features regulator for hard and soft materials, locking position for production runs, and quick voltage changeover. Bulletin MS-100. *Cardinal Engineering Corp.*

CIRCLE NO. 8, PAGE 115-116

Pneumatic sand transmission pipeline specialties include (1) especially heat-treated and hardened pipe bends, (2) temporary repair unit

with chain-type clamping bolts, (3) coupling for plain-end pipe which eliminates welding, threading or other special preparation, and (4) coupling flange for joining with installation having flanges. *Pipeline Development Co.*

CIRCLE NO. 9, PAGE 115-116

Metal surface treatment called OSPHO stops rust and prepares for painting. Requires only removal of

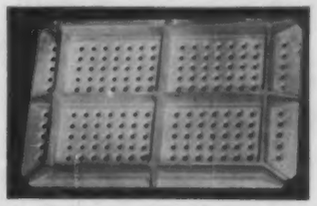
CIRCLE NO. 115, PAGE 115-116

CIRCLE NO. 116, PAGE 115-116

loose material with wire brush, before spraying or brushing on OSPHO. On new metal it produces a slight etch that assures good bond for paint. *Rusticide Products Co.*

CIRCLE NO. 10, PAGE 115-116

Aluminum bottom boards, custom-cast, are light, easily handled, may be stored outdoors, will not warp or burn, are ribbed for strength and



rigidity, can be cast with holes for lightness and gas escapement. No pattern charge. *West Way Pattern Works.*

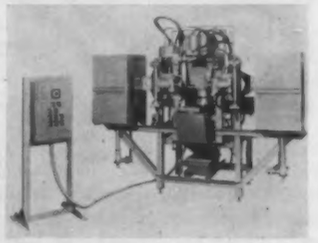
CIRCLE NO. 11, PAGE 115-116

Hoist trolley has ball bearing wheels and hardened guide rollers which permit pushing 1000 lb loads easily

by hand. Straight and curved rail, switches, and completely installed monorail systems furnished. Bulletin 56-1. *Anchor Steel & Conveyor Co.*

CIRCLE NO. 12, PAGE 115-116

Hollow core machine, Model SC-20-D handles core boxes to 20″ x 16″ x 10″. One operator, two-station Holo-



Core makes finished cores on 45 sec cycle without separate driers or ovens. Semi-automatic and manually-operated models available. Bulletin SC-100. *SPO Inc.*

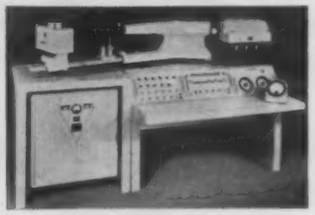
CIRCLE NO. 13, PAGE 115-116

Pattern fillets are being made of an epoxy trowelling resin No. 630 which is spread over the pattern and shaped

by a waxed, chrome-plated spherical ball. Fillet is said to bond permanently and not shrink. *Marblette Corp.*

CIRCLE NO. 14, PAGE 115-116

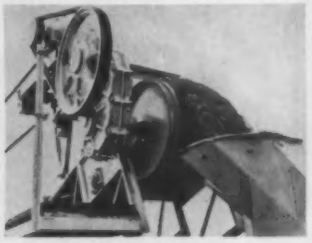
Direct reading spectrometer. JAco-Hilger Medium Quartz unit, designed for smaller non-ferrous firms, analyz-



es up to 11 constituents in less than 2 min and indicates results on meter or recorder. Catalog CH383. *Jarrell-Ash Co.*

CIRCLE NO. 15, PAGE 115-116

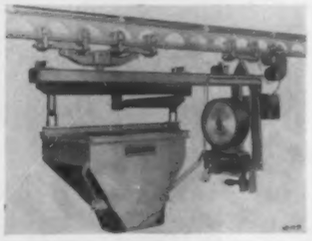
Shaft-mounted speed reducer line has new units which widen capacities to 1 to 60 hp at speeds 12 to 365 rpm. Advantages of Torque Arm reducers include: no foundation, no



flexible couplings, no sliding base, and no lining up. Overload release which loosens belts, cuts off power, and gives warning for excessive loads is available; also built-in backstop. Bulletin A-637. *Dodge Mfg. Corp.*

CIRCLE NO. 16, PAGE 115-116

Traveling scale hopper holds 1 cu yd, weighs to 5000 lb. bottom gate operates from both sides. Unit, riding on



12 ball-bearing wheels, is propelled by tractor at up to 150 fpm. *Cleveland Tramrail Div.*

CIRCLE NO. 17, PAGE 115-116

Material level indicator functioning at temperatures to 300 F in either

vertical or horizontal position consists of a motor driven paddle wheel which signals the operator or controls feed supply when material restrains the wheel. False signalling is avoided. *Fuller Co.*

CIRCLE NO. 18, PAGE 115-116

Abrasive tools (portable, air-powered). New X-4 line includes horizontal grinders and buffers, vertical grinders and sanders and right angle sanders. Series D, E, and F tools can be modified to secure improved X-4 performance. Air and high-frequency electricity tools and accessories in Catalog A-10. *Buckeye Tools Corp.*

CIRCLE NO. 19, PAGE 115-116

Creep testing machine of 20,000 lb capacity has different sub-assemblies, for long time creep tests, creep-rupture tests, relaxation tests, and constant strain rate tests. Furnace-tests to 1800 F. Strip-chart recorder adaptable. Accuracy within 1% applied load or 0.2% of capacity. *Baldwin-Lima-Hamilton Corp.*

CIRCLE NO. 20, PAGE 115-116

Pulley lagging has grooved anti-slip surface similar to tread of snow tires. Thousands of diamond-shaped rubber grippers press against underside of conveyor belt, minimize slippage on steep slopes or under wet service conditions. Maltese Cross Double Chevron pulley lagging available in any width. *Hewitt-Robins Inc.*

CIRCLE NO. 21, PAGE 115-116

Offhand grinding wheels of diamond bonded with new Cera-Met are said to hold sharp corners and require few dressings. Surface remains clean and sharp due to breakaway of diamond particles which wear flat. *Clipper Diamond Tool Co., Inc.*

CIRCLE NO. 22, PAGE 115-116

Insulation block of bonded F-20 Fiberflax ceramic fiber resists flame impingement and temperatures to 2300 F; and is chemically inert (unaffected by furnace atmosphere). Density is 20 lb/cu ft; thermal conductivity is 1.27 Btu/hr, sq ft, °F/in. of thickness at a mean temperature of 1000 F; at 2000 F it is 2.24. *Carborundum Co.*

CIRCLE NO. 23, PAGE 115-116

Polishing aid for abrasive belt operations on all metals has non-loading properties which prevent metal particles from adhering to abrasive surface. Avoids use of inflammables as

CIRCLE NO. 119, PAGE 115-116

lubricant or for wash up. Kocour belt grease comes in paper tubes 2⅛" x 8½", weighing about 1¼ lb. Write for free sample. *Kocour Co.*

CIRCLE NO. 24, PAGE 115-116

Bayonet saw for cutting all materials features orbital motion in which blade teeth contact only in up or cutting stroke and back away on the release stroke. This eliminates blade breaking friction heat and blades stay sharp much longer. Capacity: 2" wood, ¾" aluminum, ¼" steel. Model 148 permits plunge cuts without drilling starting holes. Accessory base for angle cutting. Blower keeps cut line clean. Weighs 6 lb. *Porter-Cable Machine Co.*

CIRCLE NO. 25, PAGE 115-116

Bond feeder measures and transports bentonite, wood flour, cereal binder, sea coal, silica flour, or other dry material for sand systems. Hopper holding day's supply is at ground level, may be used to supply several mixing units with different amounts of additive. *Haylco Controls Corp.*

CIRCLE NO. 26, PAGE 115-116

Index layout wheel for quick calculation and layout of tubular constructions is a measuring device that also converts circumference to diameter and vice versa. *Index Mfg. Co.*

CIRCLE NO. 27, PAGE 115-116

Exact weighing is claimed by F-M Floaxial dial scales which incorporate direct reading dial, full swivel head, cage-type central column, and controlled-speed dash pot. In 36 models from 500 lb by ½ lb graduations to 120,000 lb by 20 lb. Optional are automatic recorder, double face dials, counting attachments, remote reading, and air-operated or mercoid switches and accumulating ring. *Fairbanks, Morse & Co.*

CIRCLE NO. 28, PAGE 115-116

Vertical cup air grinder for foundries has 50% more power than others in 7-lb class. Model 5V comes in 4500, 6000, and 8000 rpm, features adjustable, positive-speed governor and built in exhaust muffler. Has 110° handles for operator convenience. Convertible to sander, wire brush, disc-wheel cut-off with guards for all operations. *Thor Power Tool Co.*

CIRCLE NO. 29, PAGE 115-116

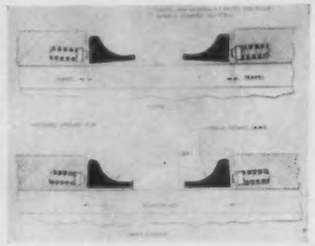
Push-on fitting for P54 rubber-covered hose for pressures to 250 psi is assembled dry or with water as lubricant by pushing hose over twin fer-

◆ CIRCLE NO. 120, PAGE 115-116

rules on fitting stem. Replacements are made without removing fitting from machine. *Flex-O-Tube Div.*

CIRCLE NO. 30, PAGE 115-116

Hold-down vise with two hinged automatic pull-down jaws speeds machine setups, eliminates parallels, and hammering, is a one-hand operation,



cleans easily, and offers close tolerances on interrupted cuts. Jaws are 5" wide and open to 4". *Illinois Metal Products.*

CIRCLE NO. 31, PAGE 115-116

Powered conveyor curves prevent clogging of turns in roller conveyor lines. 90° and 180° sections are chain driven from a ½ hp motor or conveyor head shaft. Speeds to 90 fpm. *Harry J. Ferguson Co.*

CIRCLE NO. 32, PAGE 115-116

Motorized Brinell tester features load change at turn of a screw, ¾" penetrator stroke that avoids anvil readjustment for several pieces of like thickness, has vertical opening to 9" and 6" throat. *Steel City Testing Machines, Inc.*

CIRCLE NO. 33, PAGE 115-116

Aerosol penetrating oil with molybdenum disulphide cuts paint, grease, dirt, corrosion, and is especially suit-

ed to hot applications such as furnaces. Carry without spilling. Apply in difficult positions, overhead, or distant, with 4-ft stream. *Pressure Products Co.*

CIRCLE NO. 34, PAGE 115-116

Synthetic fluid, odorless and rancid-proof, is used as lubricant for cutting

CIRCLE NO. 121, PAGE 115-116

talk of the industry

IT'S JUST AS WELL that the general public doesn't recognize castings as such. Foundries aren't so likely to be blamed if they sell the type of castings that put the industry's worst foot forward. We hope the few pounds of metal a friend of ours received recently was accidental and that other customers will get castings for their money. It is supposed to be an ash door for a fireplace, just a 5-1/2-in. square of metal about 3/8-in. thick with two lugs about as big as the last joint on your little finger. But the only relationship between the one we saw and a casting a foundryman can be proud of is that both started out as molten metal poured into a mold. This horrible example of the foundry art has swells, a ragged parting, a buckle, several veins, and a surface on one side that looks like it was cast against a handful of clay balls. The lugs are egg-shaped, not round, even though they've been severely ground to make up for the obvious mismatch of cope and drag. If a customer wants nothing else of a casting he wants a smooth surface and well defined contours because they look better and because he may have no other way to judge casting quality. Many foundries are doing a good job and are a credit to the industry. Those that aren't detract from the rest. Maybe the casting industry needs a "seal of approval" to indicate the foundries able and willing to adhere to a high quality level . . . to show which shops are producing castings with a pedigree.

KEYS TO QUALITY CONTROL listed by Nate Levensohn, foundry superintendent, Minneapolis-Moline Co., Minneapolis, recently for the Chicago Chapter of the American Foundrymen's Society include: (1) Instill the desire for producing quality castings from top management to the lowest level of supervision; (2) Establish specs for molding and core sand mixes; (3) Develop a system for establishing gating and risering—don't guess at it; (4) Control melting operations and pouring temperatures.

WE'VE BEEN PEEKING at the foundry of tomorrow over the shoulders of the AFS exhibit manager as well as the collective shoulders of the castings industry leaders who have looked into the future and will report what they see in the Bonus Section of the May issue of MODERN CASTINGS. It's interesting! The huge AFS Castings Congress and Show gives us a good idea of what foundrymen will be using as production tools in the immediate future. Opinions on the more distant future, as voiced by our crystal gazers, are mixed and it seems likely that two predominant schools of thought

are both partially right. One school visualizes sweeping changes throughout the castings industry what with atomic melting, molds made of some undefined chemical material, closed circuit television, and most manual operations reduced to button pushing. The other school sees relatively few basic changes though agreeing there will be many marked improvements and increased mechanization and automation. All agree on one thing: Good housekeeping will prevail and in-plant environmental control will be practiced universally throughout the industry.

GOOD HOUSEKEEPING PAYS OFF AGAIN! Grapevine says that a company operating a number of foundries made the biggest proportion of its profit last year from the shops with the best housekeeping. Company believes you can't afford not to be a good industrial housekeeper and the P & L statement bears it out.

SHELL MOLD MAKING has come a long way from the first crude manual dump boxes of seven or eight years ago. After a slow start due to a smoke screen surrounding the patent situation and a general wait-and-see attitude, equipment manufacturers got busy and developed machines to make shell molds, then shell cores, recognizing that shell molding poses a materials handling problem as most foundry operations do. Several foundries have been active too and have developed their own equipment which is now available commercially. Simultaneously, claims for precision have been tempered in the light of production experience. Desire to eliminate backing led to a varity of attempts to bolt, clip, and glue shells together. Then came horizontal rather than vertical partings to minimize molten metal pressure problems. Without backing, shells need more strength but until recently the only way to get it was through thicker shells (slows production, uses more sand and resin) or through more binder (resin costs money). Latest solution to higher strength shell problem is the blow-hot press technique of General Motors. Using equipment they've devised, they blow a shell in one to 3 sec, then cure it under pressure in 12 to 25 sec. Shell strength is doubled. Story will be told in the May issue of MODERN CASTINGS and at the AFS Castings Congress and Show in Atlantic City.

WHAT HAPPENS to the sodium carbonate formed when carbon dioxide reacts with sodium silicate during the hardening of molds and cores in the CO_2 process? What does it do to the pH of the sand mixture when the sand is used again? Is enough Na_2CO_3 formed to influence the fusion point of the sand after repeated use? Is it removed completely in sand reclamation? Who knows?

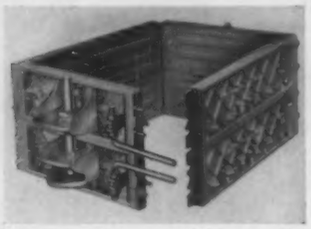
SEND ORDERS, WEATHER REPORTS, anything else that can be handled by letter or phone from Foundry Equipment Manufacturers Association Booth 1104 at the AFS Castings Congress & Show according to C. R. (Cleaning Room) Heller, FEMA executive secretary. Says public telephone and free stenographic services will be available to all equipment manufacturers.

Herbert E. Koebel

and grinding cast iron and steel and as the fluid in hydrostatic testing of castings. Hamikleer 1391 will not gum or foam; may be discarded without treatment if oils don't contaminate it. *Harry Miller Corp.*

CIRCLE NO. 35, PAGE 115-116

Flasks, straight-wall Hinge-Off, for loose, match plate, or cope and drag mounts, are made of light weight metal; have positive, fast-acting, locking mechanism. Only adjustment is



drawing up nuts of locking assembly to insure tightness when flask is closed. In lengths and widths from 10″ to 20″, by even inches; cope and drag depths from 3″ up by half inches. *Hines Flask Co.*

CIRCLE NO. 36, PAGE 115-116

Anionic surface active agent Isomal 265 is mixed with core oils for faster, more uniform penetration; with water systems to improve mulling time and efficiency; in slurry systems to minimize amount of water; and for washing foundry windows. Disperses in alcohol, acetone, petroleum solvents, oils, and chlorinated solvents. Has a neutral pH factor and specific gravity of 1.088 at 60 F, and pleasant odor. It is compatible with both nonionic and other anionic agents, and is stable up to 210 F. *Johnson-March Corp.*

CIRCLE NO. 37, PAGE 115-116

Magnetic conveyors and elevators are made from existing belt conveyors by placing Magna-Rail units under the belt. Lifts to 80° can be accomplished. Magna-Rails are completely non-electric, require no maintenance. Bulletin B88-1. *Eriez Mfg. Co.*

CIRCLE NO 38, PAGE 115-116

Belt grinders feature new rubber contact wheels and improved belt alignment adjustment. Offer better finish in less time and increased belt life. Hubs accommodate standard tires 2½″ wide, 6″ diam. *Delta Power Tool Div., Rockwell Mfg. Co.*

CIRCLE NO. 39, PAGE 115-116

Cutting and gouging. Carbonaire power source for the carbon arc-compressed air method of cutting and gouging all metals is rated at 100

amp on 85% duty, 900 on 100%, at 36-54 v. Designed for 2 or 3 phase, 60 cycle, 220/440 v (dual) or 550 (single), can be supplied for 50 or 25 cycles and direct current. *Hobart Brothers Co.*

CIRCLE NO. 40, PAGE 115-116

Draft curtain of heavily coated fabric protects workers from drafts every time doors are opened. Easily installed on single overhead track, TransWall slides back out of the way to free floor space for use. *Bemis Brothers Bag Co.*

CIRCLE NO. 41, PAGE 115-116

Wax dispensing tanks electronically heated, thermostatically controlled from 100-500 F are available in any size with one or more dispensing valves of various sizes operated by hand, foot pedal, or solenoid valve controls. *C. C. Cooper Co.*

CIRCLE NO. 42, PAGE 115-116

Vitrified grinding wheel of pastel yellow color is said to be cooler cutting, enable operators to see the work better due to sharper contrast, and assure quick recognition in stockroom replacement. *Electro Refractories & Abrasive Corp.*

CIRCLE NO. 43, PAGE 115-116

1-5 hp AC motors in new lines are designated Standard Enclosed and Severe Duty Enclosed to fit more closely customer needs. Latter line is designed for use in corrosive or excessively moist atmospheres. *General Electric*

CIRCLE NO. 44, PAGE 115-116

Fork truck Cargo-Scout handles 3000-lb loads in confined areas through short wheelbase and 360° steering; features worm drive, packaged unit assemblies, contractor controls, and a caster-type trail axle. *Elwell-Parker Co.*

CIRCLE NO. 45, PAGE 115-116

Bridge amplifier meter for use with both static and dynamic work with SR-4 strain gages and similar types of resistance transducers. Using four transistors, the unit is self-contained for static work, requires a dc cathode-ray oscilloscope for dynamic work. *Ellis Associates.*

CIRCLE NO. 46, PAGE 115-116

Surface thermometer entirely of stainless steel, with 50-1000 F range, shows easily read temperature within 60 sec. Also measures ambient temperatures of furnaces and ovens as well as in non-corrosive liquids

continued on page 115

let's get personal

Roger F. Waindle . . Boston engineer is now serving six month term of office as Chief, Castings Branch, Iron and Steel Division of the Business and Defense Services Administration, Department of Commerce. Waindle is on loan from his positions as vice-president, Misco Corp.; staff consultant, Consolidated Foundries and Mfg. Co.; and president, WaiMet Eng. Co.

John M. Allen . . has been promoted to plant personnel director at Defiance, Ohio, plant of Central Foundry division of General Motors Corp.

Robert H. Burnell . . has been appointed production manager of bentonite operations for Federal Foundry Supply Co., Cleveland.

Morehead Patterson . . board chairman and president of American Machine & Foundry Co., New York, has been appointed chairman of the Planning Committee on Standardization in the Field of Nuclear Energy by the American Standards Association.

Dr. A. B. Everest . . Mond Nickel Co., Ltd. exec and president of the Institute of British Foundrymen, has been named vice-president of the International Committee of Foundry Technical Associations. He is expected to succeed to the presidency of the committee in 1957 and to preside at the International Foundry Congress to be held in Stockholm that year.

Herbert J. Weber . . ASME has named AFS director of Safety, Hygiene and Air Pollution Control program to serve on ASME Air Pollution Controls Committee as AFS liaison.

Richard Herold . . has been named general sales manager of Harrisburg Steel Corp., Harrisburg, Pa., but will continue to serve also as vice-president of foundry sales for the firm's Taylor-Wharton division.

L. M. Diran . . has been placed in charge of cast constructional steel developments for development and research division of International Nickel Co., Inc., New York.

Robert W. Mason, Jr. . . has joined metals processing division of Curtiss-Wright Corp., Buffalo, N. Y., as sales engineer for castings.

Top level personnel changes at American Cast Iron Pipe Co., Birmingham, include election of **Arnold J. Herrmann** to executive vice-presidency. Acipco's long-time technical director, **Dr. J. T. MacKenzie,** retired April 7 to join Southern Research Institute and was succeeded by **J. T. Vann,** assistant works manager. **C. K. Donoho** becomes assistant technical direc-

Dr. A. B. Everest

R. F. Waindle

Dr. J. T. MacKenzie

or and chief metallurgist. Another promotion in the company made Carl P. Farlow, Jr., chief engineer.

Acquisition of Kaukauna Machine Corp., Kaukauna, Wis., by Giddings & Lewis Machine Tool, Co. resulted in personnel changes that make **Erich**

E. C. Wussow

C. Wussow a v-p of Giddings & Lewis and general manager of the Kaukauna plant which now operates as Kaukauna Machine & Foundry Div. **Walter J. Gotstein** is foundry manager and **E. P. Thoma**, foundry superintendent.

W. J. Gotstein

Lynchburg Foundry Co., Lynchburg, Va., has named **Charles W. McLennan** vice-president and general manager, replacing Lloyd C. McNeill who

C. W. McLennan

resigned. Lynchburg also announced appointment of **H. R. Fisher** as a senior metallurgist.

CIRCLE NO. 125, PAGE 115-116

Anthony DeYoung . . has retired as advertising manager of Whiting Corp., Harvey, Ill., after 45 continuous years with the firm. During his 37 years as

A. De Young

ad manager, DeYoung helped start the Engineering Advertisers Association, forerunner of the Chicago Industrial Advertisers Association. He served two terms as secretary and one as treasurer of the latter group.

F. W. Ellis

Fred W. Ellis . . has been appointed to newly created position of foundry engineer at Hamilton Foundry & Machine Co., Hamilton, Ohio. Robert C. Wayne was named as sales manager.

R. C. Wayne

Texas Steel Foundries, Inc., Lufkin, Texas, has announced a series of appointments starting with promotion of **Arthur P. Guidi** to steel foundry superintendent succeeding Harlie Free-

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man. **Eli Stua** becomes assistant steel foundry superintendent while **Harry D. Hunt** has been named project engineer in the industrial engineering department.

H. D. Hunt

William G. Koles . . has been named Michigan sales representative for George Sall Metals Co. His headquarters will be in Detroit.

Calvin K. Kirk . . former Chicago district sales engineer for Norton Co. has been appointed to post of product research engineer at the company's Worcester, Mass., headquarters.

Dr. Charles J. Gogek . . recently joined Arthur D. Little, Inc. Cambridge, Mass., consulting firm. Gogek formerly worked for Corn Products on use of starches and sugars as adhesives for sand.

T. D. Owens . . has been appointed manager of foundry coke and pig iron sales for Alan Wood Steel Co., Conshohocken, Pa.

W. W. Sly Mfg. Co., Cleveland manufacturer of dust control systems and cleaning equipment, has named **Allen**

Allen Jones

Jones as director of engineering. Another promotion made **Harry R. LeSage** Chicago district sales manager.

John B. Shallenberger . . president of Shallway Corp., shell molding

equipment builder, adds presidency of Albert Sheetz Corp. to his duties. Sheetz firm makes candy.

James Thomson . . has retired as chief works engineer of Continental Foundry & Machine division of Blaw Knox Co., East Chicago, Ind.

J. M. Thomson

Milo L. Phillips . . joined Alloys & Chemicals Mfg. Co., Inc., Cleveland, Ohio, as sales engineer and technical consultant.

Paul Lang . . has been promoted to sales engineer by Fahralloy Co., Harvey, Ill., manufacturer of heat resistant castings.

Richard C. Aylward . . named general sales manager of Bohn Aluminum and Brass Corp., Detroit.

Daniel McDyre . . has been named superintendent of Dodge Steel Co., Philadelphia steel foundry, replacing Gustave F. Ebeling who retired January 26.

William I. Matthes . . elected executive vice-president of Arwood Precision Castings Corp., Brooklyn, N. Y.

W. I. Matthes

Curtis L. Bierley . . will represent Magie Bros. Oil Co., Franklin Park, Ill., in Ohio and Western Pennsylvania.

E. J. Lavino & Co. have announced retirement of **Raymond E. Griffith** as

vice-president of refractory sales and engineering. He is succeeded by **Gaylord T. Stowe.**

Bruce W. Markey . . has been appointed service manager for Shalco Corp., Connellsville, Pa.

B. W. Markey

Elvin W. Day . . named plant manager of Ford Motor Co.'s new aluminum castings plant being built at Sheffield, Ala.

Eugene C. Clarke, Jr. . . has been elected president of Chambersburg Engineering Co.

R. G. Megaw . . left U. S. Gypsum Co. to join Baroid Div., National Lead Co., as sales engineer.

David A. Schiffer . . has been promoted to eastern manager of raw material purchases for Apex Smelting Co., and will headquarter in Cleveland.

C. Richard Sword . . appointed manager of sales for Aerovent Fan Co., Inc., Piqua, Ohio.

So where are these employers who were supposed to grab us for executive positions?

Plumbing Brass Group Forms in Pittsburgh

February 14 saw thirty manufacturers of plumbing brass meet to organize the Plumbing Brass Institute, an all-industry association resulting from the merger of the Sanitary Brass Institute, Tubular Brass Goods Institute, and the Brass Gas Stop Institute.

The new group is subdivided into four product sections: rough cast plumbing brass, finished cast brass, tubular plumbing brass, and brass gas stops and iron body valves. Its address: Suite 759, One Gateway Center, Pittsburgh 22, Pa.

A. H. Goepel, Scoville Mfg. Co., the newly elected president of the Institute, explained, "The Plumbing Brass Institute was formed to provide a single association more representative of the . . . . industry. It will provide a central organization through which the industry can carry on broader activities which will be beneficial to individual member companies."

The Institute's program includes industry statistics, market analysis, labor reports, standards, and a broad public relations program with emphasis on inter-association activities. Hanson & Shea, Inc., Pittsburgh, will serve as secretary for the new group.

Die Casters Start Field Rep Program

To improve technical service offered by job shop die casters to industry, a new field representative program has been started by the American Die Casting Institute.

David Laine, secretary of the organization, states that the new field organization is a reflection of the steady growth of job shop die casting business. Three field representatives have now been named, with a fourth soon to be appointed. All are men with long records of success in die casting developments.

The principal activity of the field men will be to coordinate the development activities of die cast shops to meet the problems of industry.

The new field representatives of the institute are: C. M. Rollason, eastern; J. C. Fox, central; J. M. Davis, Pacific Coast.

pouring off the heat

says new manual a "must"

■ H. C. Erskine, Dr. D. A. Irwin, and I have recently had the opportunity of studying the AFS ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT IN FOUNDRIES. It contains such a wealth of material presented in usable form that we consider it a "must" on the reference shelf. Please send eight more copies.

LESTER V. CARLLEY
Chief Industrial Hygienist
Aluminum Co. of America

happens on best magazines

■ I liked your editorial treatment of my article (*"Direct Arc Furnace Doubles in Bronze,"* pp. 34-35, January) but was not too pleased to note that you had cut our sun dial from 14 feet to four feet.

T. R. STANLEY
Plant Supt., Foundry
Consolidated Mining & Smelting Co. of Canada, Ltd.

Our original caption correctly gave the diameter as 14 feet. Noting that the caption was too long, one of our over-zealous editors not only shortened it by rewriting, but reduced the diameter by 10 feet.—Editor.

■ Your attention is called to a grievous error or omission in the condensation of my introductory remarks to the Symposium on Non-Destructive which you abridged as the Bonus Section in the February issue of MODERN CASTINGS. The inference is that roentgenological inspection of cast metal parts must be the cause of high and costly rejection of excessive numbers of finished components whereas the impression I intended to create was that lack of sound fundamental knowledge of the real influence of possible defects on mechanical properties and service behavior resulted in discarding parts which would in reality have performed satisfactorily had the truth been known.

HANS J. HEINE
Technical Director
American Foundrymen's Society

All thinking foundrymen and editors will agree that radiographic examination, per se, cannot be blamed

for rejection of castings. The type set by the printer referring to this was "millions of dollars worth of finished parts and thousands of man-hours were lost, primarily in the aircraft industry, as a result of radiographic rejection of castings. This resulted because arbitrary standards had been established with fear as a basis rather than sound knowledge based on the results of tests." *Unfortunately the qualifying sentence at the end of the preceding statement was lost during the publication process.—Editor.*

inspires future foundrymen

■ The filmstrip "A Career in Metal" went over very well with my metalworking classes. The boys liked it well enough to bring forth some serious and interesting questions. It was shown to grades 7, 8, 9, and 10.

We have a small foundry area in our shop; casting is all in aluminum. The interest in this subject is surprising and I think the element of creativeness has much to do with it.

Good teaching aids are hard to come by and I think the Northwestern Pennsylvania Chapter of the American Foundrymen's Society is to be congratulated on this contribution to education.

CORNELIUS M. CANAVAN
Gaskill Jr. High School
Niagara Falls, N. Y.

"A Career in Metal," produced by the AFS Northwestern Pennsylvania Chapter, is a 30-minute audio-visual portrayal of the modern castings industry as a career opportunity for young men and women. An educational kit consisting of script, 35mm film strip of 55 full color illustrations, suitable instructions for various audiences, and a 33-1/3 rpm professional voice recording with musical background is available from the education chairman of the Northwestern Pennsylvania Chapter, Earl M. Strick, 629 Beverly Drive, Erie, Pa.—Editor.

new books

Specifications for Steel Piping Materials . . ASTM. x +425 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3. 1955. Non-members $4, members $3.

Specifications cover pipe used to convey liquids, vapors, and gases at normal and elevated temperatures, still tubes for refinery service, heat exchanger and condenser tubes, boiler and superheater tubes. Also specifications for castings, forgings, bolts, and nuts used in pipe installations.

Plant and Process Ventilation . . W. C. L. Hemeon. x +437 pp. Industrial Press, 93 Worth Street, New York 13. 1955, $9.

Emphasis is placed on estimating ventilation quantities required in various industrial situations and the subject of duct design has been simplified by condensation of design data. Several new design principles are presented. Three chapters on fundamentals establish groundwork for more advanced information. For the student or engineer interested in ventilation.

Improving the Work Skills of the Nation . . National Manpower Conference, Proceedings, x +203 pp. Columbia University Press, Columbia University, New York. 1955. $3.50.

Summarizes discussions of the National Manpower Council's 1955 conference which was attended by sixty-nine representatives from industry, labor, education, the armed forces and government. Offers a broad picture of how the secondary schools, industry, and the community can contribute to the improvement of the nation's work skills.

Chemical Methods in Industrial Hygiene . . Frederick H. Goldman and Morris B. Jacobs. x +274 pp. Interscience Publishers, Inc. 250 Fifth Avenue, New York 1, 1953. $3.75.

Detailed descriptions of many of the analytical methods available to the chemist for the examination of the materials, substances, and samples that are encountered in the field of industrial hygiene.

Foundry Manual for Sand Casting Aluminum-10 Percent Magnesium Alloy. PB 111577. 118 pp. Battelle Memorial Institute for Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. 1954. $3.25.

Intended to help foundrymen achieve a better understanding of 220 alloy and of the factors which influence the quality of castings made from it. In emphasizing principles more than details of foundry practice, the manual attempts not only to recommend general proce-

dures but also to clarify the reasons why such procedures are necessary. Principles discussed apply, to a large extent, to all aluminum alloys, and should also be helpful to foundries which are experiencing difficulty in producing sound castings of other alloys.

Studies in the Behavior of Certain Non-Ferrous Metals at Low Temperatures . . Final Report, Vol. 1. PB 111657. Alfred Bornemann and Theodore Gela, 152 pp. Stevens Institute of Technology for Office of Technical Services, United States Dept. of Commerce, Washington 25, D. C. 1955. $4.

Concerned with the effects that operating and storage conditions at low temperatures may have on metallic components used in Signal Corps equipment.

Low temperature engineering properties of beryllium copper, nickel and nickel-base alloys, Invar or Nilvar, tin, molybdenum, tungsten, germanium, tantalum, and some tantalum-tungsten materials were among the investigations made.

Metallurgy . . Alvin S. Cohan. 20 pp. Bellman Publishing Company, Cambridge 38, Mass. 1955. $1.

No. 33 in the Vocational and Professional Monographs series, this booklet is background material to be used in planning a career. Included is the history of the occupation, qualifications for employment, training required, methods of entry, opportunities for advancement, earnings, general trends in the field and a list of sources of further information. Similar data on other occupations is also available from Bellman.

Steels for the User (3d ed.) . . R. T. Rolfe, xvi +399 pp. Philosophical Library, Inc., 15 East 40th St., New York 16. 1956. $10.

The aim of this book is to bridge the gap between science and practice for carbon steels in industry. It covers commercial steels, effect of composition on mechanical quality, heat treatment, use at elevated temperatures, fatigue and weld testing and the general principles of selection.

Gas Turbines and Jet Propulsion (6th ed.) . . G. Geoffrey Smith, revised and enlarged by F. C. Sheffield . . 412 pp. Philosophical Library, Inc. 15 East 40th St., New York 16. 1955. $15.

The sixth edition of this English book gives the history of the development of the gas turbine for aircraft as well as the latest information. 342 photographs and drawings.

Problems and Control of Air Pollution . . Frederick S. Mallette (ed.) vi +272 pp. Reinhold Publishing Co., 330 W. 42nd St., New York, N. Y. 1955. $7.50.

Papers presented at the First International Congress on Air Pollution, as part of 75th Anniversary celebration of the ASME. Featured chapters are by Sir Hugh E. C. Beaver, "The Growth of Public Opinion," and G. Edward Pendray, "Management Aspects of Air Pol-

lution." Other sections are devoted to Gaps in the Available Knowledge on Air Pollution, Current Developments in Air Pollution, Sulfur Dioxide—Treatment and Recovery, and Experience in Air Pollution Abroad.

Handbook of Barrel Finishing . . Ralph F. Enyedy. vi +255 pp. Reinhold Publishing Co., 330 W. 42nd St., New York 18. 1955. $7.50.

All phases of barrel finishing from cleaning and deslugging to coloring, polishing and burnishing are covered. More than 150 specification sheets provide all information necessary for finishing a large variety of parts. Latest developments in equipment, finishing compounds, and methods are described in detail.

Vacuum Metallurgy . . iii +213 pp. Electrochemical Society, 216 W. 102nd St., New York 25. 1955. $5.

Papers presented at the Vacuum Metallurgy Symposium of the Electro-thermics and Metallurgy Division of the Electrochemical Society.

Metals Handbook—1955 Supplement . . American Society for Metals. 208 pp. ASM, 7301 Euclid Ave., Cleveland 3, 1955. $6.

Follows the general pattern of the 1954 Supplement. 21 articles have been written by 19 technical committees of the Society and divided into four sections: Metals and Applications, Design and Application, Processing and Fabrication, and Testing and Inspection. Numerous graphs, tables, and illustrations add to the utility of this book, which brings up-to-date various sections of the 1948 edition.

Chromium . . A. H. Sully. xii +272 pp. Academic Press, Inc. 125 E. 23d Street, New York 10. 1954. $5.50.

Written in England, this book is the first of a series—Metallurgy of the Rarer Metals. It is a reference on the background and metallurgical, chemical, and physical data of the metal. Chapter on melting and casting.

ASTM Specifications for Steel Piping Materials . . Committee A-1 on Steel. x +425 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3. 1955. $4 to nonmembers; $3 to members.

Latest approved form of 58 ASTM Specs. for ferrous pipe, tubes, castings, fittings, and bolting materials.

Principles of Metal Casting . . R. W. Heine and Philip C. Rosenthal. ix +639 pp. McGraw-Hill. Prepared in cooperation with the Textbook Committee of the Education Division of AFS. Obtain from American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill., 1955. $7.50.

Prepared as a textbook for either metallurgical-engineering students or mechanical-engineering students, this book is also very well suited for general

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reference work in the field of metal casting. Details of all casting operations, including designing, are considered. The book is well illustrated and contains numerous bibliographic references for future reading. It has been organized so that principles associated with molding processes and materials, solidification of metals, and castings are presented in the first eleven chapters; the principles are then interpreted for the specific casting alloys (fourteen chapters); and the special metallurgical principles of melting, alloying, heat treating, and metallurgical processing are confined to portions of the latter fourteen chapters.

The Modern Building Encyclopaedia . . N. W. Kay (ed.) 768 pp. Philosophical Library, Inc. 15 E. 40th St., New York 16. 1955. $15.

Alphabetical listing of all building trade terms, by more than thirty experts in the field. Very well illustrated.

Metallurgical Progress—2. J. M. McLeod, D. D. Howat, and H. B. Bell. 71 pp. Philosophical Library, Inc., 15th East 40th St., New York. 1955. $6.

A second series of critical reviews discussing Preparation of Ores, Electric Steel Production, and Non-Metallic Inclusions.

Rare Metals Handbook . . Clifford A. Hampel (ed.) xiii +657 pp. Reinhold Publishing Company, 330 W. 42nd St., New York, 1954, $12.

General and specific information on 34 uncommon metals with selected bibliographical references. Includes latest methods of production from ores or other raw materials, the chemical and physical properties, fabrication techniques, and present and potential uses.

Development of Sand-Cast Aluminum-Base Alloys Having Improved Properties . . PB 111699 . . (Final Report) 60 pp. Office of Technical Services, Business and Defense Services Administration, U. S. Department of Commerce, Washington 25, D. C. 1955. $2.

Describes research on sand-cast, aluminum-base alloys conducted for the Frankford Arsenal by Battelle Memorial Institute. Studies were made on Al-Mg-Zn Alloy and Al-Mg Alloy. 20 ref.

Materials of Construction . . M. O. Withey and G. W. Washa. 887 pp. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 1954. $9.

Compilation of mechanical properties and uses of the major engineering materials. Has 15 chapters on metals, one of which is on cast and malleable iron.

Industrial Furnaces, Vol. II . . (3d ed.) W. Trinks. x +358 pp. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1955. $10.

Incorporates all the advances in the field of furnace technology since 1941. Each chapter has been greatly revised and the chapter on safety was completely rewritten. Chapter headings: Fuels and Electric Energy, Combustion De-

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vices and Heating Elements, Control of Furnace Temperature, Control of Furnace Atmosphere, Labor-Saving Appliances, Critical Comparison of Fuels and of Furnace Types, Safety Measures.

Brazing Manual . . American Welding Society. vii +193 pp. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 1955, $4.75.

Up-to-date details of all brazing processes used in the automotive, aircraft, refrigeration, electronics and other mass-production metal industries. Appendix covers properties of brazeable metals and alloys.

Advanced Cost Accounting Methods for Gray Iron Foundries—Cost Manual No. 2 recently reviewed in this column costs $10.00 instead of $5.00 as previously reported. The manual, an outgrowth of Cost Manual No. 1 which is included as a supplement in the new manual, is published by the Gray Iron Founders' Society, Inc., National City-East 6th Bldg., Cleveland 14, Ohio.

Iron Moulding for Apprentices . . Francis D. Roper, viii+135 pp. 68 fig. Ernest Benn Ltd., Bouverie House, Fleet St., London, EC4, England, 1955. 15s.

After a short history of the craft, the author discusses types and preparations of sands, tackle and equipment used, various types of patterns, pressures set up in molds during pouring, gating methods, ramming and venting practices, and many other subjects.

Welding and Cutting . . J. A. Oates. iv 93+pp. 44 fig. Percibal Marshall and Co., Ltd., 19-20 Noel St., London, W.1., England. 1955. 5 shillings.

A handbook discussing all phases of welding and cutting of metals by the oxy-acetylene and metallic arc processes.

How Foremen Can Control Costs . . Phil Carroll viii+301 pp. McGraw-Hill Book Company, 330 W. 42nd St., New York 36. 1955. $4.

Explains what production costs are and how they effect the company, its employees, and its customers. Stresses what the foreman can do himself as a supervisor to hold costs down in the factory or office. In short easy chapters training, salvage, tools, material, maintenance, changes in production overhead, reports, effect of competition, etc. are discussed. Demonstrates how the success of the company benefits the foreman and the people whom he supervises.

Handbook of Engineering Materials . . Douglas F. Miner and John B. Seatone (editors) xi+1382 pp. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 1955. $17.50.

First section provides general information on specifications and standards, statistics in the application of materials, and mathematical and physical tables. Second section is devoted to metals and includes ferrous metals, aluminum, magnesium, copper and its alloys, zinc,

nickel, and its alloys, other pure metals, and special purpose metals and alloys.

Details for non-metals are given in the third section. Wood and woodbase materials, paper, fibers, plastics and rubbers, organic finishing materials, fuels, carbon products, ceramic materials, industrial chemicals, and lubricants are treated here. Construction materials are covered in the final section.

Practical Plant Layout . . Richard Muther. xiii+363 pp. McGraw-Hill Book Co., 330 W. 42nd St., New York. 1955. $12.00.

Covers all essential elements of good plant layout. Deals with both new plants and old ones that can be redesigned for more efficient use. Four basic phases--location, overall layout, detailed layout, and installation—are discussed. Eight factors: material, machinery, man, movement, waiting, service, building and change are considered and illustrated.

Designing for industry . . F. C. Ashford. x+222 pp. Philosophical Library, Inc., 15 East 40th St., New York 16. 1955. $7.50.

Presents a picture of the designing profession as it exists in England at this time. It is addressed to those who are already practicing and to those who desire to practice as well as those whose work brings them into direct contact with the design of the product.

The chapter Methods and Materials discusses casting, powder metallurgy, pressing, die-forging, spinning, etc. Bibliographies and a thorough index are included.

Electrons, Atoms, Metals and Alloys . . William Hume-Rothery, 387 pp, 171 photos and diagr. Philosophical Library, Inc., 15 East 40th St., New York 16. 1955. $10.

Written primarily for the metallurgical reader who cannot spend much time with the book at one sitting as an elementary introduction to modern atomic theory. It is divided into four parts dealing with the structure of atoms, metals, alloys, and atomic nuclei and is presented in the form of a dialogue between an older metallurgist and a young metallurgist, thus representing the old and the new viewpoints.

Higher Mathematics for Students of Chemistry and Physics . . (4th ed.) J. W. Mellor. xxi+641 pp. Dover Publications, Dept. 42, 920 Broadway, New York 10. 1955. paperbound, $2.

Mathematics presented from a more practical than theoretical viewpoint. Exhibits mathematical technique and their immediate applications to experimental phenomena, mostly on the intermediate level. Has been a mathematical aid to chemists and physicists for many years.

NANCY PURUCKER, *Librarian*
American Foundrymen's Society

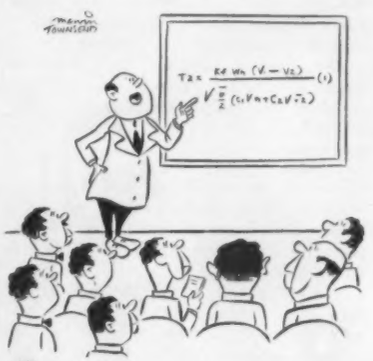
CIRCLE NO. 136, PAGE 115-116

Steel Founders Will Seek Inorganic Bond Material

The Steel Founders' Society, continuing its search for an inorganic bonding material other than clay, has earmarked nearly $100,000 for the research project.

Horizons Inc., Cleveland research and development firm, has been awarded a contract to carry out the work. Their job is to find an inorganic material which will produce a strong, accurate mold; which will remain effective at molten steel temperatures to 315 F; permit rapid mold curing; cause molds to be pyroplastic (lose brittleness under heat) and yet retain shape; disintegrate easily after casting; keep mold and bond gas-free; and stay inert enough to not contaminate the metal.

Chairman of the society's Technical Research Committee is H. D. Phillips, Adirondack Foundries & Steel, Inc.



Now if this is clear to all of you, someone explain it to me.

AFS Sand Division Plans Exhibits

The Sand Division of the American Foundrymen's Society will exhibit the results of research projects carried out by four of its committees during the Castings Congress at Atlantic City, May 3-9.

Work done by the Shell Molding Materials Testing Committee, Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures Committee, Mold Surface Committee, and the Physical properties of Steel Foundry Sands at Elevated Temperatures Committees will be on display.

Look to Malleable Markets

Market for malleable and use and acceptance of malleable castings will highlight the 7th Annual Market Development Conference to be staged by the Malleable Founders' Society April 12 and 13 at the Edgewater Beach Hotel in Chicago.

First day's program will deal with MFS activities and joint efforts of malleable shops to increase markets. Dinner speaker that evening is Wm. Gove, president EMC Recording Co., St. Paul, Minn. Entire second day will be devoted to discussions of use and acceptance of malleable castings, with participation by a group of design engineers and customer representatives.

Office of the Malleable Founders' Society is at 1800 Union Commerce Bldg., Cleveland 14, Ohio.

The Chaser

The helpers all say that my job is a cinch
That it doesn't take muscle or brains.
If they like it so well, then why in the hell
Doesn't anyone want to chase cranes.
They'll work on the shakeout or furnace;
They'll work in the yard when it rains.
They'll freeze or they'll sweat, they'll get soaking wet.
But nobody wants to chase cranes.
That guy over there wants a forty-eight square
He'll cuss to beat hell if you're late.
And down there a man wants a bucket of sand,
And the guy next to him wants a plate.
The heat, set for eight in the doghouse, is late.
They won't let me put on the chains.
This job is a pain; the reason is plain;
Why nobody wants to chase cranes.
The hook in your belt is a drag on your hips
A trunnion pinches your hand.
A bucket bail trips and smacks your lips
And pushes you down in the sand.
Hammering, prying, wedges a-flying,
And you get tangled up in the chains.
So, brother, you see it's no mystery to me
Why nobody wants to chase cranes!

From *Rammed Up and Poured*, book of foundry poems by Bill Walkins, former sand mill operator, editor of *The ESCO Ladle* of Electric Foundry Co., Portland, Ore.

Job for Retired Founder

Do you believe it is better to wear out than to rust out? Would you like to be retired but still wear lightly the harness of your castings career? Consider this. The fully equipped foundry of the Museum of Science & Industry in Chicago needs two men—a supervisor and a combined molder and general helper. The shop carries out all the operations of a foundry and has cupola, crucible, and electric furnace melting facilities.

This working exhibit operates Wednesday through Sunday and on all holidays except Christmas. Fall, winter, and spring schedule is 9:30 am to 4:00 pm. Summer schedule is 9:30 am to 5:30 pm.

Anyone interested can contact Museum of Science & Industry, % Mr. Pater, Chicago, Ill. Phone number is Museum 4-1414.

More Copper Mining Seen

Capacity of the free world's copper mines should reach 3,386,600 short tons by 1958, reports the Copper & Brass Research Association. Industry expectations are that, barring major strikes or similar disruptions, mine production will respond to the pressure of growing demand

The additional capacity, 15.7 per cent over the 1955 figure of 2,928,000 tons, is based on a recent survey of expansion projects and new properties which will come into production during the next three years. The CABRA survey shows increasing action in the United States, Canada, Africa, and Chile—all major copper producing areas. In the United States alone, 148,000 short tons of new capacity are foreseen for 1958, an increase of 13.6 per cent over 1955. The Bureau of Mines has already announced that output of recoverable copper here rose 19 per cent in 1955, despite industry strikes during July and August.

And after 1958? The best guess is that South America will contribute another 120,000 tons, bringing free world capacity to at least 3,506,000 tons.

CIRCLE NO. 139, PAGE 115-116

Study Aluminum Corrosion

Some aluminum alloys can resist corrosion in either a marine or inland atmosphere for at least 20 years, report F. M. Reinhart and G. A. Ellinger of the National Bureau of Standards staff. Their long-range study undertaken for the Navy Bureau of Aeronautics also provides data on the effects of heat treatment and protective coatings on corrosion rates.

Begun in the early '30s when high-strength aluminum alloys were still classed as "experimental", the NBS study covers 20 years' actual test results on corrosion resistance of alloys which in some cases have only recently been converted to commercial status. Specimens 0.75 by 9 inches were exposed in selected locations at Washington, D. C. and the Canal Zone.

The alloys studied included those which could be hardened by heat treatment as well as those not susceptible. Among them were aluminum-manganese 3004-H34, aluminum-magnesium 5254-H34, clad and bare aluminum-copper alloys 2017 and 2024, alloys containing nickel, cadmium, or copper and cadmium, and aluminum-magnesium-silicon alloys in which hardening is due to the intermetallic compound MgSi.

Effects of corrosion were evaluated periodically by visual and microscopic inspection, and by tensile tests. Tensile strength and elongation were compared with control values. The full story is told in ASTM STP 175, "*Atmospheric Corrosion of Non-ferrous Metals*" to be available soon.

AFS Group Officers to Meet

Chairmen and program chairmen of American Foundrymen's Society chapters who will serve for the 1956-57 term will meet in Chicago June 28-29 at the LaSalle Hotel, Chicago, at the 13th Annual Chapter Officers Conference. Joining the group for the first time will be representatives of the Connecticut and the Pittsburgh Chapters which were installed since the last officers conference. AFS has 44 industrial chapters and 12 student chapters in engineering schools located in the major foundry centers.

CIRCLE NO. 139, PAGE 115-116

for the asking

Planned mechanization for foundries, featuring NeWay equipment is presented in 20-page bulletin covering floor systems, Handy Sandy, Reddy Sandy, complete sand handling systems and component parts. *Newaygo Engineering Co.*
CIRCLE NO. 58, PAGE 115-116

Industrial marking on any surface. Circular describes Markal Paint-sticks and provides a use chart to aid in the proper selection for surface and temperature conditions. Recommended samples are forwarded upon completion of supplied questionnaire. *Markal Co.*
CIRCLE NO. 59, PAGE 115-116

Dust control. 24-page Bulletin 277B describes the function and characteristics of the Roto-Clone Type N Hydrostatic precipitator. *American Air Filter Co., Inc.*
CIRCLE NO. 60, PAGE 115-116

Glascast process. 20-page Bulletin GC-2 explains use of Glascast powder in molding for high melting point alloys; also mixing of plasters for basic molds. Gives data on pilot run quantities of fine surface, close tolerance castings. *Corning Glass Works*
CIRCLE NO. 61, PAGE 115-116

Phenol-formaldehyde binder. Technical Bulletin F-1 gives composition, advantages, baking, storage, mixing, and physical characteristics of cores made with Foundrez 7101. *Reichhold Chemicals, Inc.*
CIRCLE NO. 62, PAGE 115-116

Ultrasonics for the non-destructive detection and location of defects in materials is described in 8-page Bulletin 50-105 which illustrates uses of Reflectoscope. *Sperry Products, Inc.*
CIRCLE NO. 63, PAGE 115-116

Ductile iron publications List D includes heat treatment, wear properties, hardening characteristics of induction heated ductile iron, joining, description of six main types of ductile iron, low temperature toughness, machining and grinding. *International Nickel Co., Inc.*
CIRCLE NO. 64, PAGE 115-116

Bentonite brochure describes Yellowstone western foundry bentonite and source; gives typical chemical analysis and test results on bonding with different mixes. *Magnet Cove Barium Corp.*
CIRCLE NO. 65, PAGE 115-116

Portable mold dryers involving circulating air are described in Bulletin 802. Advantages, applications, and specifications of Coleman line are given. *Foundry Equipment Co.*
CIRCLE NO. 66, PAGE 115-116

59 Answers to Your Shell Molding Problems is title of 6-page article that includes problem of peeling or drop-off, sticking or binding, warping, poor filling, cracking, casting fins, surface imperfections, and casting shrinking. *General Electric Co.*
CIRCLE NO. 67, PAGE 115-116

Art in cast iron on the Richards House in Mobile, Ala., pays high tribute to

the foundrymen's craft. Complete description and story are offered by *United Oil Mfg. Co.*
CIRCLE NO. 68, PAGE 115-116

Clay company describes product, processing equipment, and controls in 4-page bulletin. Offers free samples

of bonding clay, fire clay, and air floated clay. *Cedar Heights Clay Co.*
CIRCLE NO. 69, PAGE 115-116

Foundry equipment listed in 58-page hinge-bound Catalog 69 includes: rolled steel channel flasks—standard, heavy duty, and stack-molding; flask

accessories—bars, clamps, pins and bushings, bands and upsets, and steel core plates and bottom boards; and wheelbarrows, carts, and trays. *Sterling Wheelbarrow Co.*
CIRCLE NO. 70, PAGE 115-116

Material handling in malleable iron foundry. Case History Report 31 tells how battery powered 6000-lb capacity mobile crane with electro-magnet on truck's battery handles 200,000 lb scrap daily; loads skid boxes with scrap part of day, then loads end dump bucket that feeds cupola skip hoist. Pictures and diagrams of unique operation. *Elwell-Parker Electric Co.*
CIRCLE NO. 71, PAGE 115-116

Industrial waste treatment Bulletin 315-111 covers purposes for treating, equipment involved, material recovery, re-use liquids, and elimination

of pollution. Describes equipment for coarse screening, grit removal, settling, skimming, and flocculation. *Chain Belt Co.*
CIRCLE NO. 72, PAGE 115-116

Molding and cut-off machines. Condensed Catalog 6 gives specifications for jolt, jolt-strip, jolt-squeeze, jolt-squeeze-strip, jolt-squeeze-rollover

CIRCLE NO. 141, PAGE 115-116

and draw, jolt-rollover and pattern draw, stack, and hand-ram molding machines. Also 4 models of abrasive cut-off machines. *Tabor Mfg. Co.*
CIRCLE NO. 73, PAGE 115-116

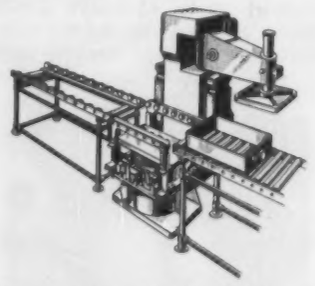
Avoid unnecessary tucking, butting, and peening says Data 244 which discusses application of western bentonite to molding mixes. Increased flowability, improved shakeout conditions, and avoidance of baked and lumpy sand are covered. *American Colloid Co.*
CIRCLE NO. 74, PAGE 115-116

V-belt drives. 36-page pocket-size booklet 20E8297 tells origin, history, and development of modern multiple V-belt drive; covers engineering standards, provides tables and data; describes drive modifications. *Allis-Chalmers Mfg. Co.*
CIRCLE NO. 75, PAGE 115-116

Blast Cleaning & Dust Control News, v XI, no. 2, has items on application of 3-wheel Rotoblast room and Tru-Steel shot, cost cutting application of a 6' Table room, and king-size 10' version of versatile Table room in steel foundry. *Pangborn Corp.*
CIRCLE NO. 76, PAGE 115-116

Lubricating industrial machines. 24-page *Foote Prints,* v 27, no. 2, discusses manufacture and use of new lithium multipurpose grease. *Foote Mineral Co.*
CIRCLE NO. 77, PAGE 115-116

Pneumatic shockless jolt squeeze and pattern draw machine for medium to extremely hard molds at high production rates is described in 8-page



bulletin which gives features of machine's main cylinder, operating valve, and pneumatic swing arm as well as layout and specifications. *British Moulding Machine Co., Ltd.*
CIRCLE NO. 78, PAGE 115-116

Colloidal dispersions in metal casting tells the use of "dag" colloidal graphite in permanent mold, die, sand casting and other foundry operations. Bulletin 425 treats use with water, petroleum oil, alkyd-resin solutions,

aromatic solvents; giving formulas for high lubricity, wetting action, heat resistance, easy parting, non-scouring action, and heat transfer. *Acheson Colloids Co.*

CIRCLE NO. 79, PAGE 115-116

Belt conveyor idler, Series 50 described in Folder 2516, is new from

base to ball bearings; is available greaseable or factory sealed, in 7 belt widths from 14" to 36". *Link-Belt Co.*

CIRCLE NO. 80, PAGE 115-116

Shell tensile test described in *GE Foundry Facts,* issue 12, is the American Foundrymen's Society tentative standard tensile test for the control of shell molding sand mixtures. Scope, specimen, equipment, and procedures are given. *General Electric Co.*

CIRCLE NO. 81, PAGE 115-116

Oxygen analyzer. 16-page Catalog 55-892-56 explains principle, construction, operation, and features of both the paramagnetic type Magno-Therm analyzer and the electronic recorder. Chart of major applications lists functions, examples of services, and how and why analyzer is used. *Hays Corp.*

CIRCLE NO. 82, PAGE 115-116

Patents of methods and apparatus for producing better castings are described in 12-page bulletin. 15 patents enjoyed by Reecemelt licensees include water cooled, basic cupola; controlled air flow to cupola tuyeres; fluxing material; tuyere arrangement; fluidity test; pressurized cupola; "master recipe" for iron; multiple windboxes; cupola apparatus; and wedge testing. *Reecemelt.*

CIRCLE NO. 83, PAGE 115-116

Plastics in the Foundry Industry, 6-page publication, explains advantages of plastic tools. outlines step-by-step procedures for production of loose patterns, match plates, core prints,

and core driers for dielectric baking; also patching worn metal core boxes. *Marblette Corp.*
CIRCLE NO. 84, PAGE 115-116

Water clarification. 10-page technical reprint T-138 covers operating factors and selection of chemical treatment for water clarification; theoretical chemical problems of coagulation, also physical consideration of the process. *Graver Water Conditioning Co.*
CIRCLE NO. 85, PAGE 115-116

Package dust collector is described in Bulletin 172-CFF. Says heart of Aerodyne is louvered cone separator. Specifications. *Green Fuel Economizer Co., Inc.*
CIRCLE NO. 86, PAGE 115-116

Water damage to industrial buildings is described in catalog that tells how Magic-Vulc Vinyl coatings protected masonry of buildings that went through two recent disastrous storms. *Magic Chemical Co.*
CIRCLE NO. 87, PAGE 115-116

Spectrograph in making of iron and steel covers sampling; excitation—temperature, working surface, arc wandering, metallurgical history; excitation potentials; and miscellaneous samples—solutions, common matrix. *National Spectrographic Laboratories, Inc.*
CIRCLE NO. 88, PAGE 115-116

Silo storage of materials in bins of super-concrete. Brochure covers stave construction, waterproofing, pre-stressed reinforcement; has table of capacity data. *Neff & Fry*
CIRCLE NO. 89, PAGE 115-116

Clamshell buckets for 2-line operation are described in 8-page bulletin. Special features defined; reeving instructions given; specifications listed for rehandler, barge type, general purpose, and hard digger buckets. *Erie Strayer Co.*
CIRCLE NO. 90, PAGE 115-116

Snagging wheel Bulletin GS55 describes advantages of various types of construction of grinding wheels including resinoid and vitrified wheels. *Electro Refractories & Abrasives Corp.*
CIRCLE NO. 91, PAGE 115-116

Air conditioning of crane cabs is included in 20-page Bulletin 561 which discusses values of air conditioning and illustrates and describes Lintern units. *Larco, Inc.*
CIRCLE NO. 92, PAGE 115-116

Flexible hose Bulletin 60 covers use of Flexaust hose and Portovent duct for moving air, dust, fumes, and mate-

rial by pressure, suction, or gravity. Characteristics, and specifications and prices. *Flexaust Co.*

CIRCLE NO. 93, PAGE 115-116

High vacuum pumps. Bulletin V-51B covers description, operation, and specifications of single stage and compound vacuum pumps, also vacuum tight valves. *Kinney Mfg. Co.*

CIRCLE NO. 94, PAGE 115-116

USCO's monthly digest, v 10, no 1, abstracts articles on refractory material for permanent molds, degassing fluxes, vertical gating, exothermic and insulating risers, core baking, marketing, die cast redesign, and aluminum coating methods. *U. S. Reduction Co.*

CIRCLE NO. 95, PAGE 115-116

Basic cupola operation. 8-page bulletin discusses advantages of this development, explains mechanics of basic slag systems, lining installation and maintenance procedures, also difficulties and corrective measures. *Basic Refractories, Inc.*

CIRCLE NO. 96, PAGE 115-116

Beryllium copper use for dies in zinc die casting is discussed in 4-page article; production life is given, also advantages in die manufacture, cost, and maintenance. *Beryllium Corp.*

CIRCLE NO. 97, PAGE 115-116

Spectrographic supplies. 24-page Catalog, SS-8-55 contains listings of special pure materials and alloy standards, carbon and graphite rods and powders, preformed electrodes, photographic plates, film, and processing chemicals, and lists of texts and reference books. *Jarrell-Ash Co.*

CIRCLE NO. 98, PAGE 115-116

Ceramicast process is described in 4-page bulletin which traces history and principles of the process and illustrates several major applications; also discusses advantages of quality, cost, and versatility. *Lebanon Steel Foundry.*

CIRCLE NO. 99, PAGE 115-116

Welding high-alloy castings is 6-page technical article on work with 15% Cr-35% Ni and development of a test plate for determining weldability and procedures. *Acros Corp.*

CIRCLE NO. 100, PAGE 115-116

Portable electric tools covered in 60-page catalog F-14116 include: saws, drills, disc sanders, portable and bench grinders, belt sanders, planes, blowers, radial saws, router, and accessories. *Skill Corp.*

CIRCLE NO. 101, PAGE 115-116

Portable hardness tester. King Brinell machine may be used in cramped spaces, eliminates test bars, can be used near vibrating equipment, tests materials in any position. *King Tester Corp.*

CIRCLE NO. 102, PAGE 115-116

Epoxy adhesives. Brochure describes Epibond adhesives application in metal, plastic, and ceramic bonding. *Furane Plastics*

CIRCLE NO. 103, PAGE 115-116

Produce literature directory, 9" x 4", 24-page "This is A-C From A to Z" is an alphabetical description of company products and literature on them, a brief history of the firm, and a listing of plants and offices. *Allis-Chalmers Mfg. Co.*

CIRCLE NO. 104, PAGE 115-116

Heat resistant products 32-page Catalog G-10 includes heat and corrosion resistant products such as furnace muffles, furnace trays and fixtures, retorts and pit type furnace equipment, pickling equipment, plating room equipment, heat treating boxes and equipment. *Rolock, Inc.*

CIRCLE NO. 105, PAGE 115-116

Plastic ladle lining bulletin also recommends graphitic Silex P-21 for cupola wells, tap holes, slag holes, spouts and runners, malleable spouts and runners; shows a typical method of lining a ladle with Silex P-21 and lists advantages. *J. H. France Refractories Co.*

CIRCLE NO. 106, PAGE 115-116

Maintenance welding "How to Overcome Your Welding Problems and Improve Your Welding Techniques," 8-page bulletin covers maintenance design, effect of heat, base metal identity, basic steps, affinity of metals, strength of materials. *Eutectic Welding Alloys Corp.*

CIRCLE NO. 107, PAGE 115-116

fhp DC motors and equipment are described in 12-page Bulletin GEA-6068 which includes typical applications, ratings, and specifications of standard models; also facilities, engineering, and application assistance available for the design and production of special models. *General Electric Co.*

CIRCLE NO. 108, PAGE 115-116

Sand conditioning equipment. Six-page bulletin describes use and operation of all current models of "The Moulders' Friend" machine. *"The Moulders' Friend."*

CIRCLE NO. 109, PAGE 115-116

Saga of Lazy Jim Day

Oh, they hired a guy they called
Lazy Jim Day,
A hilligan straight from the holler.
They offered him sixty-five cents on
the hour
But Jim Day held out for a dollar.

They started him out in the yard,
switching cars,
But he sat right down on the track.
Then at bellhop they tried him, but
when he was sent,
He always forgot to come back.

In chip room and foundry they gave
him a try
At grinding, and knockout and
pastin',
But he just stood around with his
hands in his pants
And said to himself, "Time's a-
wastin'."

At machine work and craning and
welding and painting.
In every part of the shop,
Old Jim always shirked, the guy nev-
er worked;
His efforts were always a flop.

The foreman finally gave up in de-
spair
And had the clerk write out his
pay.
"I can usually fit a man in," said the
boss,
"But I can't place old Lazy Jim
Day."

But the big shots said, "No, there's
a shortage of men;
To fire the guy just won't do.
When we lose any one of them out
of the shop
We can't replace old ones with
new."

So the big guns they held a big
pow wow
On the twenty-third Sunday in
May.
Other business came up, but the
main topic was
What to do with old Lazy Jim Day.

And this is the end of the tale. Ev-
erything
Must come to an end or a bound-
ary.
They decided the man wasn't worth
a damn;
Now he's running the sand mill—
main foundry.

From *Rammed Up and Poured*, book of foundry poems by Bill Walkins, former sand mill operator, associate editor of *The ESCO Ladle* of Electric Steel Foundry Co., Portland, Ore.

New AFS Committee Roster Shows Activities Scope

Every phase of foundry production and technology is covered by the more than 100 national committees of the American Foundrymen's Society according to the organization's latest National Committee Personnel roster recently released. Including some 550 of the top management, technical, and production people in the castings industry, the committees are grouped into eight specific interest divisions set up to accumulate information in the fields of light metals, brass & bronze, education, gray iron, malleable, patternmaking, sand, and steel.

Other fields of foundry practice are covered by the general interest committees, six of which work on safety, hygiene, and air pollution control matters.

According to the roster, any member of AFS may indicate his desire to serve as a member of any technical committee of the society. He should express his interest in writing to the chairman of the division or the general interest committee of his choice, describing his experience and qualifications. Committee appointments are made—not by the AFS Headquarters staff—but by the chairman of the committee to which the application is appointed.

Membership in AFS is not a condition for committee appointment where specialized information might otherwise not be made available to the castings industry.

. . . Then turn right . . . two doors down make another right . . . and his office is over here.

AFS 60th CASTINGS CONGRESS and EXHIBIT

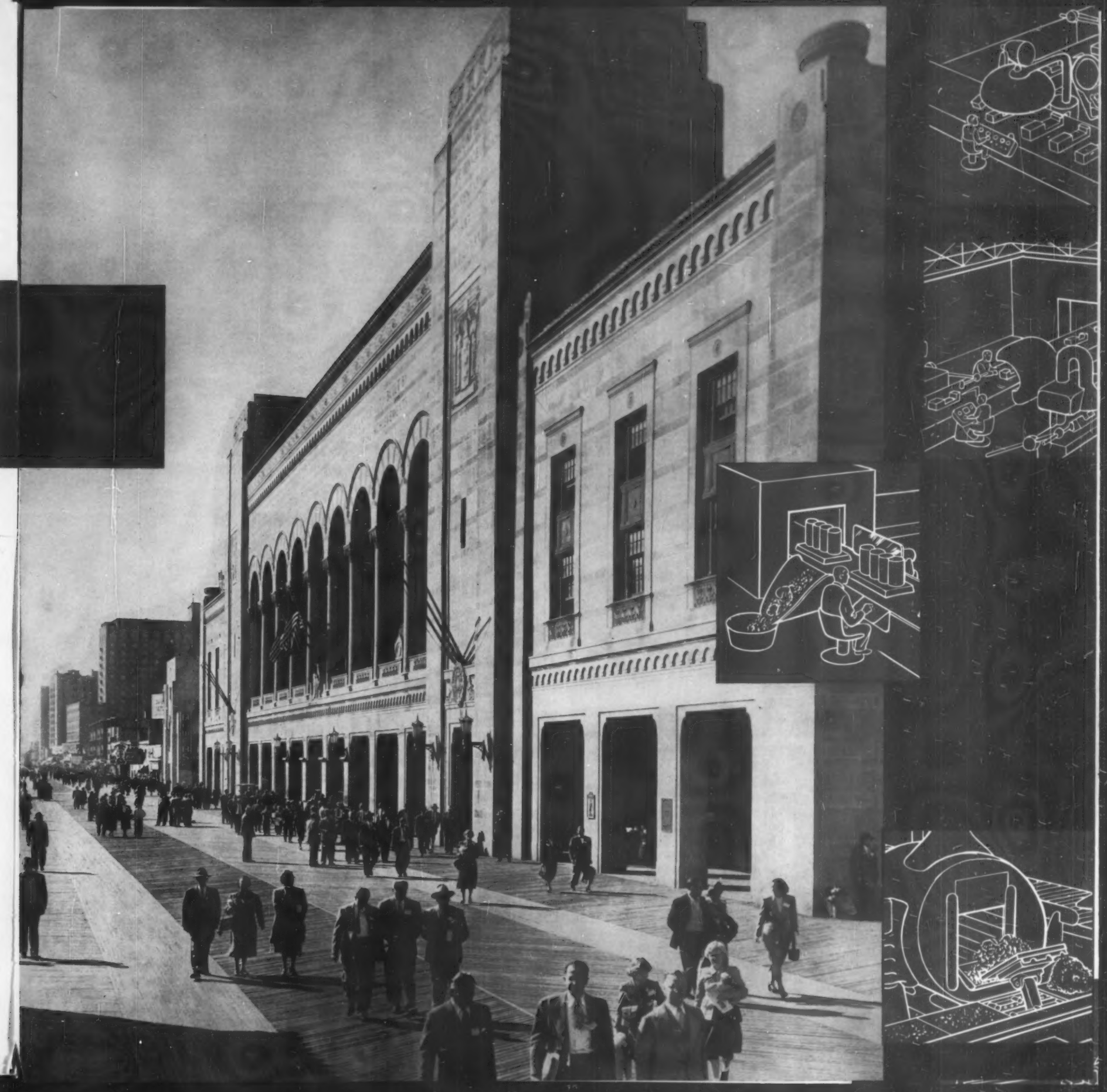
■ TOOLS AND TECHNIQUES FOR TOMORROW'S FOUNDRY will highlight the 60th Castings Congress and Show as the American Foundrymen's Society returns to Atlantic City May 3-9 for its 1956 annual convention. In the New Jersey resort and convention city with the world's largest exhibit hall and unparalleled hotel facilities for the third time, this year's AFS Castings Congress far exceeds in exhibit display space the 1952 convention at which AFS played host to the International Foundry Congress.

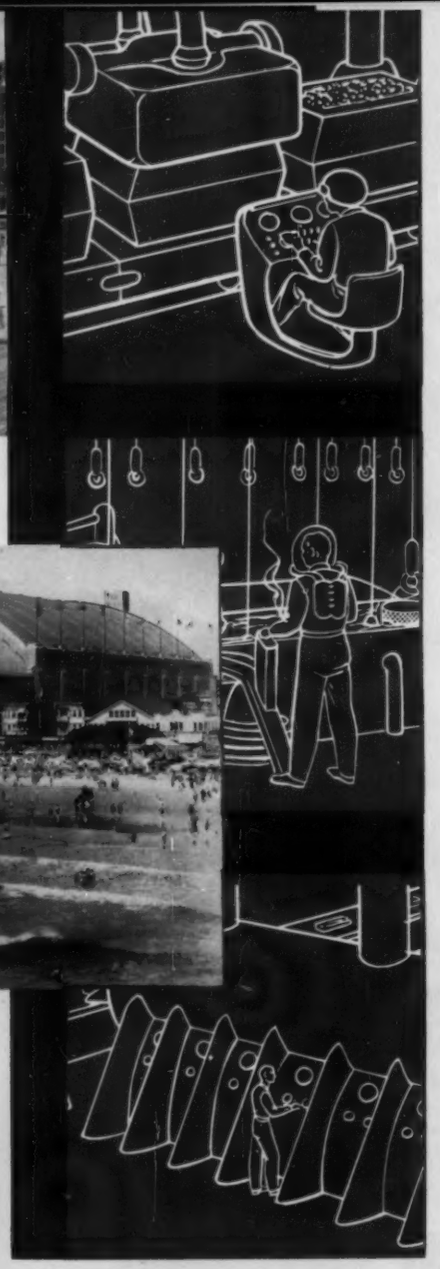
The well-balanced program of technical papers, round table luncheons, and shop course sessions planned by the Society's more than 100 technical committees and some 250 exhibits of foundry machines and materials supplement each other to provide a week-long opportunity for foundrymen to study tomorrow's foundry technology today.

Concurrent with the exhibits and technical sessions is a series of business meetings and social gatherings, and a special program for the ladies. Plants in nearby Philadelphia will be open for inspection during Castings Congress Week.

Officiating throughout the week will be the president of the American Foundrymen's Society, Bruce L. Simpson, National Engineering Co., Chicago. He will preside at the annual banquet the evening of Friday May 4 when the principal speaker will be Dr. Norman Vincent Peale (page 67) and gold medal awards and honorary life memberships (page 68) will be presented.

All daytime technical meetings and the huge exhibit will be held in the Atlantic City Convention Hall which will be headquarters for all activities except the ladies program. Location of meetings and exhibits in the same building provides maximum opportunity to view all the displays and take in the greatest number of sessions. Luncheon meetings and authors break-





The famed Boardwalk will soon be ringing with the footfalls of over 15,000 foundrymen who will crowd into the world's greatest exhibition building.

fasts will be held in nearby hotels.

High proportion of operating exhibits, presaged by the unprecedented demand for larger than usual display space by exhibitors, guarantees that foundrymen attending the 1956 Castings Congress will find solutions to many of their production problems involving equipment. Responding to the theme "The Foundry of Tomorrow," the organizations which provide the machines, materials, supplies, and services to the $6 billion metal castings industry will show some $5 million worth of their wares in a single, compact 2-acre area.

Complete list of exhibitors will be published as a special feature in the May issue of MODERN CASTINGS along with an exhibit floor plan giving display locations keyed to the list. For ready reference, exhibitors will also be shown in buyers guide form to simplify location of manufacturers and suppliers of specific types of products.

Among the exhibits covering every aspect of castings production will be 10 operating displays featuring shell mold and core making, four showing the CO_2 process, and one on glass molds for precision castings, in addition to many devoted to the traditional widely used methods and materials of mold and core production.

Sand preparation and reclamation will be illustrated by a number of exhibits, along with several featuring handling of sand pneumatically and by mechanical means. Materials handling equipment of all types—more and more important in the mechanized shop of tomorrow—will be shown in numerous booths and will range over the whole field of foundry practice including shakeout, sand, molds, castings, molten metal, fuel, and melting stock.

Melting units for ferrous and non-ferrous metals heated by coke, gas, oil, coal, and electricity will be shown. Cupolas for use with cold and with hot blast, and with acid, basic, and carbon linings will be on display at the show.

In the field of cleaning and finishing new developments will include new grinding wheel flanges which eliminate accidents due to wheel breakage, and a fluid drive swing grinder.

Eight exhibits will be devoted to testing, among them the latest in non-destructive methods of determining soundness, hardness, and stress magnitude and distribution. Several displays will feature rapid methods of analysis of metals.

"Stabilized wood" for patterns and core boxes joins the displays of patternmaking materials for the first time this year, thus providing the castings industry with another material to augment the usual woods, metals, plaster, and plastics.

Exhibits will be open during the day only and like the technical sessions are open only to registered convention-goers. Saturday May 5 has been designated Atlantic Coast Day and on this day only payment of a registration fee will not be required.

Paralleling this year's outstanding exhibit is the series of technical sessions, shop courses, and round table luncheons which provide foundrymen an opportunity to exchange ideas on current casting production practices and to learn the latest in new techniques. Here are some of the highlights.

Among sessions devoted to steel casting practice are two on "snotters." Others will present information on hot tearing, dust control, and carbon-arc pad washing.

Newest development in malleable iron—malleable base spheroidal graphite iron—will be described at a joint malleable-gray iron round table luncheon. Recent advances in pearlitic iron and in annealing equipment and atmospheres will be covered at other sessions.

"Fluid coke," potential new molding medium based on a waste product of the petroleum industry, will be covered at a sand session. Core blowing developments and the CO_2 process as practiced in England are other sand papers.

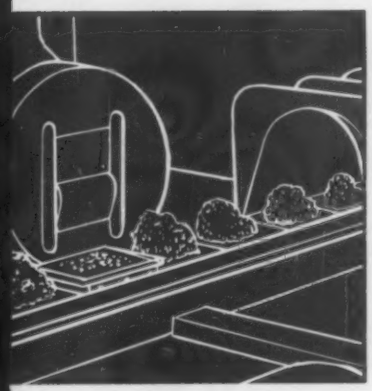
Light metals foundrymen will hear papers on gases in light alloys and methods of degassing, the latest AFS-sponsored research on vertical gating systems, and recent developments in metal mold casting.

Centrifugal casting of brasses and bronzes in permanent molds will share honors with applications of radiography among a number of outstanding papers in the B & B field.

Return to favor of plastic patterns and the use of epoxy resins will be described at one of the patternmaking sessions.

Cupola melting, with considerable emphasis on hot blast and raw materials, will receive more than usual attention as will casting tolerances, pig iron, and welding in the gray iron sessions.

Full official program for the 60th



AFS Castings Congress appears as the Bonus Section in this issue of MODERN CASTINGS. For a quick look at Congress highlights, convenient capsule comments on major activities are listed below.

▪ **Technical Sessions.** Scheduling of technical activities has followed the practice established over the years of grouping meetings by industry interest in so far as possible. This enables foundrymen to take in the maximum number of meetings in the shortest possible time. Summarized, the program of over 50 sessions shows:

Gray Iron. Thursday May 3 through Tuesday May 8, four technical sessions, two shop course meetings, one round table luncheon.

Malleable. Thursday May 3 through Saturday May 5, two technical sessions, one shop meeting, one round table luncheon.

Sand. Thursday May 3 through Wednesday May 9, six technical sessions, two shop course meetings, one round table luncheon.

Brass & Bronze. Thursday May 3 through Saturday May 5, three technical seessions (one a defective casting clinic), one round table luncheon.

Pattern. Friday May 4 through Tuesday May 8, two technical sessions, one round table luncheon.

Education. Friday May 4 through Monday May 7, two technical sessions, one round table luncheon.

Light Metals. Friday May 4 through Tuesday May 8, three technical sessions, one round table luncheon.

Plant & Plant Equipment. Friday May 4 through Wednesday May 9, three technical sessions, one a joint meeting on air pollution.

Industrial Engineering-Costs. Saturday May 5 through Tuesday May 8, two technical sessions, one round table luncheon.

Refractories. Saturday May 5, one technical session.

Heat Transfer. Monday May 7 and Tuesday May 8, two technical sessions.

Steel. Monday May 7 through Wednesday May 9, three technical sessions, one round table luncheon.

Safety, Hygiene, & Air Pollution Control. Tuesday May 8 and Wednesday May 9, three technical sessions (one a joint meeting on equipment), one round table luncheon, and a management dinner.

Fundamental Papers. Tuesday May 8, one technical session.

▪ **Advance Registration.** Up to April 23, foundrymen can register in advance of the 1956 AFS Castings Congress and Show by using the convenient form published in the February issue of MODERN CASTINGS (page 21) and also distributed widely by direct mail. Personal registration badge will be sent promptly and registrant will be able to walk right into the exhibits and sessions without delay.

All company and sustaining members of AFS may register *any* of their employees at the member rate of $2.00. Non-member registration is $5.00.

All exhibitor representatives *who will be manning exhibit booths* are being registered gratis through blanket registration made by exhibiting companies.

1956 Castings Congress paper authors and speakers and bona fide students are not required to pay a registration fee.

▪ **Daily Attendance List** printed each day will show name of individual, company, and hotel. Hotel assignment made by AFS Housing Bureau will not appear on list unless indicated on registration card.

▪ **Hotel Application.** Congress housing is handled by the AFS Housing Bureau in Atlantic City. Application form, list of hotels and prices, and map showing location appeared on pages 28-29 of the January issue of MODERN CASTINGS and was also distributed by mail.

▪ **Preprints of Technical Papers.** Nearly 50 papers on this year's program are available as separate preprints or as articles in MODERN CASTINGS. Preprint request forms mailed early in March have been coming into the AFS Technical Center which in turn is dispatching preprints requested to facilitate preparation of oral and written discussion.

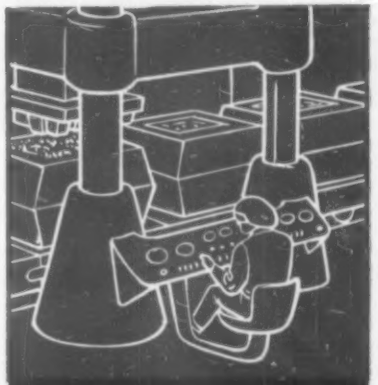
▪ **Exhibit Hours.** Exhibit hall will be open from 9:00 am to 5:30 pm May 3, 4, 7, 8, and 9. Exhibits will not be open Sunday May 6 nor any evening. Saturday May 5 exhibit hours are from 9:00-12:00 noon and 2:00-5:30 pm.

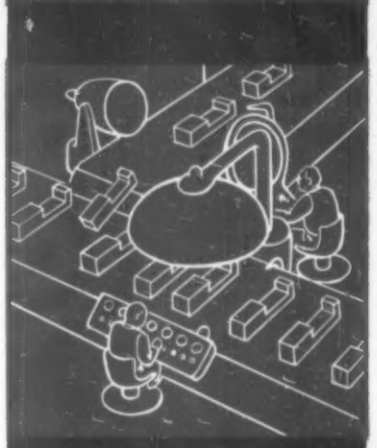
▪ **Annual Business Meeting.** Election of officers and presentation of Robert E. Kennedy Apprentice Contest awards will occur at a luncheon meeting Saturday May 5. The noon luncheon meeting replaces the special business session of former years. AFS President Bruce L. Simpson will preside.

▪ **Hoyt Memorial Lecture.** S. C. Massari, former AFS technical director, who joined National Engineering Co. recently, has selected *"Marketing Your Product"* as his subject for the Charles Edgar Hoyt Memorial Lecture (page 67). The lecture will follow the Saturday May 5 annual business meeting luncheon. Exhibits will be closed during the luncheon, business meeting, and lecture.

▪ **Annual Banquet.** Rescheduled to be held in the American Room, Traymore Hotel, 7:30 pm Friday May 4 instead of the following evening as shown in tentative programs. Principle speaker: Dr. Norman Vincent Peale, author of *The Power of Positive Thinking*, minister of Marble Collegiate Church, New York. Gold medals and honorary life memberships in the American Foundrymen's Society will be presented to outstanding foundrymen chosen for recognition this year by the AFS Board of Awards.

▪ **Ladies Program.** Social events for the ladies traditionally start with the AFS Tea scheduled this year for the afternoon of Thursday May 4. Full ladies program of luncheons, special trips, style shows, and shopping tours will appear in the May issue of MODERN CASTINGS.





■ **Old Timers Registration.** As in the past, old timers will register in a special book provided for them at the AFS Technical Center booth. Those with 25 or more and 50 or more years of service in the castings industry will receive appropriate recognition pins.

■ **Canadian Registration Book** also will be located in the AFS booth as a convenience to Congress attendants who want to let others from the provinces know they are there, and to facilitate contacts with Canadian founders.

■ **International Registration Book,** a convenience to overseas visitors who will want to contact friends, also will be found in the AFS headquarters booth.

None of these special registration books takes the place of official Congress registration which is required of all attending the show and the technical sessions.

■ **Canadian Dinner, preceded by** the usual reception, is scheduled for Sunday May 6. Reception starts at 6:30 pm in the Rose Room of the Traymore Hotel.

■ **AFS Alumni Dinner.** Annual dinner meeting of the "official family" of AFS—present and past officers, directors, medalists, honorary life members—will be held the evening of Monday May 7. Reception starts 6:00 pm in the Belvedere Room of the Traymore Hotel.

■ **Past Presidents Luncheon.** This traditional gathering of past national presidents of AFS, a breakfast meeting in former years, has been set for Sunday noon May 6 in the Chippendale Room of the Traymore.

■ **Manpower.** Personnel, skill requirements, and training for workers in mechanized foundries will be discussed at the Education Round Table Luncheon Friday noon May 4, Kerry Hall, Shelburne Hotel. Report on a nationwide survey made in January by the U. S. Bureau of Apprenticeship will be presented.

■ **Noise.** Legal aspects of industrial noise will be considered at a luncheon Tuesday May 8, 12:00 noon, Kerry Hall, Shelburne Hotel. Practical demonstration of industrial noise propagation and reduction by a number of noise barriers of varying effectiveness will follow the luncheon.

■ **Management Dinner** will be highlighted by a presentation on air pollution as a community relations problem. Difficulties arise, it will be shown, not primarily because of air pollution but because of a community's lack of understanding of industry's problems. This dinner will be held at 7:00 pm Tuesday May 8 in the Belvedere Room of the Traymore Hotel.

■ **Publications** of the American Foundrymen's Society will be on sale in the AFS booth. In addition to the more than 60 currently available publications, there will be those now being released. These include the revised AFS CAST METALS HANDBOOK, ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT IN FOUNDRIES, SYMPOSIUM ON NON-DESTRUCTIVE TESTING, and PRINCIPLES OF METAL CASTING.

■ **Modern Castings** will show in its exhibit how it is constantly increasing its service and value to readers and advertisers of the castings industry.

■ **Research** sponsored by AFS and its practical value to the castings industry will be portrayed in an exhibit set up by the technical committees of the Society. Recommended practices developed in the field of gating, risering, mold surface effects, elevated temperature properties of molding sands, nonferrous melting control, and many others will be shown along with some of the test facilities. Also to be shown is a color-sound film covering simple, practical horizontal and vertical gating systems which an increasing number of foundrymen have adopted since their development under the direction of AFS technical committees.

■ **Robert E. Kennedy Apprentice Contest.** Patterns and castings entered in the final judging of this year's competition for apprentices and learners will be displayed as in the past. Losers as well as prize winners will be shown in the five fields of competition—wood patternmaking, metal patternmaking, iron molding, steel molding, and non-ferrous molding. Foundrymen and patternmakers will be able to examine all these entries and compare craftsmanship and ingenuity of the castings industry leaders of tomorrow.

■ **Atlantic Coast Day, Saturday** May 5 is a "free" day. No registration fee will be charged on Atlantic Coast Day as a courtesy to foundrymen and patternmakers able to attend exhibits and technical sessions only on this day. Foundries in the Philadelphia, Metropolitan, and Chesapeake Chapter area are receiving special tickets which will enable eastern foundrymen to attend the Castings Congress and Show free on Saturday May 5 only. Tickets for Atlantic Coast Day free registration also will be available at the registration counter in Convention Hall.

■ **Metallography Symposium.** Two two-hour sessions starting at 8:00 pm the evenings of Monday and Tuesday May 7 and 8 in the Rose Room of the Traymore Hotel have been set aside for a symposium entitled *"Metallography for the Foundryman."*

■ **Castings Defect Clinic.** Scheduled for the afternoon of Saturday May 5 at 3:00 pm is a clinic for study of causes and remedies of defective brass and bronze castings. Foundrymen are invited to bring defective castings to the session for discussion.

■ **Round Table Luncheons.** An increasing number of round table luncheons has been scheduled in recent years to accommodate the needs of the various AFS divisions and committees for informal sessions with a maximum opportunity for audience participation and floor discussion. This year eight round table luncheon meetings will be held: Brass & Bronze, joint Malleable and Gray Iron, Education (three separate simultaneous sessions)—Friday noon May 4; Light Metals—Monday noon May 7; Industrial Engineering-Costs, Pattern, Safety & Hygiene & Air Pollution Control—Tuesday noon May 8; Steel—Wednesday noon May 9.

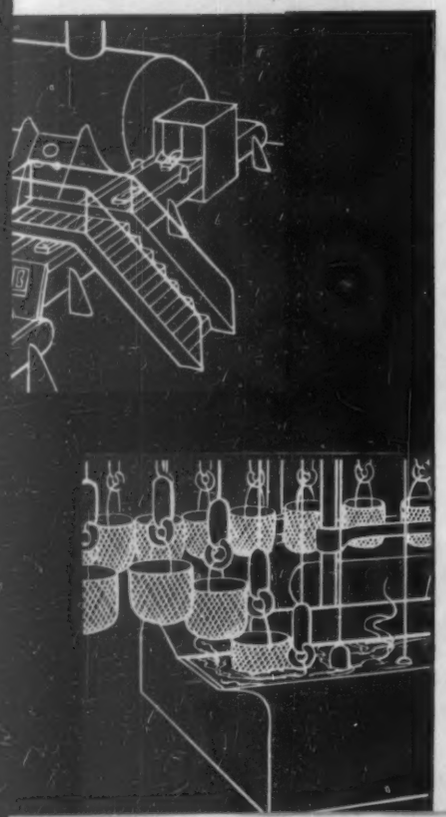
■ **Sand Dinner.** New developments in the CO_2 process and in core blowing will be covered in a dinner sponsored by the AFS Sand Division. Dinner starts at 7:00 pm the evening of Saturday May 5 in the Rose Room of the Traymore Hotel.

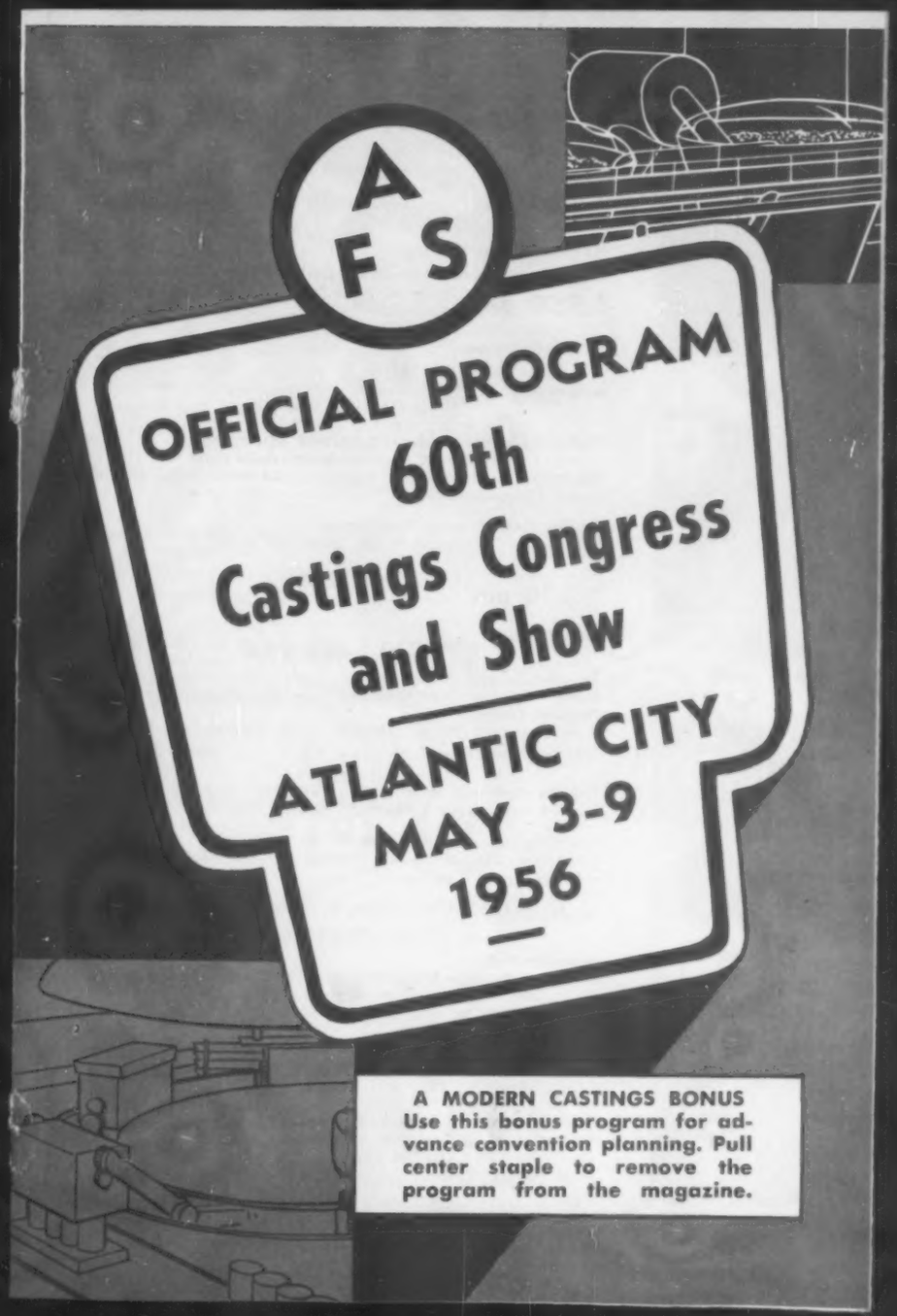
■ **Shop Courses.** Four shop courses, specifically designed for informal discussion of shop problems will be held this year. While intended for the operating man they are open to all and do not require a Castings Congress badge for admittance. On schedule are: Gray Iron—Thursday evening May 3 and Friday afternoon May 4; Malleable—Saturday afternoon May 5; Sand—Monday and Tuesday evening May 7 and 8; Metallography—Monday and Tuesday evening May 7 and 8.

■ **Plant Visits.** An important element in all AFS exhibits of equipment and materials is the visits to nearby plants in which foundry tools on display can be observed under actual production conditions. This year a number of Philadelphia foundries will be open to Congress-goers and the list, complete with addresses and operations to be seen, will be published in the May issue of MODERN CASTINGS.

■ **Non-Ferrous Founders' Society** will hold its annual membership meeting Thursday May 3 in the Marlborough-Blenheim Hotel. An all-day session, the meeting includes a luncheon, with the annual dinner in the evening.

■ **Foundry Educational Foundation.** Breakfast for the board of trustees of FEF is scheduled for the Traymore Hotel.

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OFFICIAL PROGRAM
60th
Castings Congress
and Show
ATLANTIC CITY
MAY 3-9
1956
A MODERN CASTINGS BONUS
Use this bonus program for advance convention planning. Pull center staple to remove the program from the magazine.

J. A. Davis

H. W. Deem

H. W. Lownie

R. V. Righter

■ *Thursday, May 3*

▪ 8:30 am

Registration opens

▪ 9:00 am

Exhibits open

▪ 12:00 noon

Joint AFS-NFFS Management Luncheon
Rose Room, Marlborough-Blenheim Hotel

What the Castings Buyer Expects from the Foundryman
Panel Discussion

Author-chairman luncheon
Diamond Room, Shelburne Hotel

▪ 2:30 pm

Gray Iron
Room 13, Convention Hall

(Preprint 56-26)
Service Life of Iron Castings Can Be Affected by Their Thermal Conductivity
J. A. Davis, H. W. Deem, and H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, Ohio.

The Stress-Strain Relationship for Gray Iron
E. M. Stein, Batelle Memorial Institute

Cracking and Life of Ingot-Molds
J. Duflot, Institut de Recherches de Siderurgie, St.-Germain-en-Laye, France.

Malleable
Room 1, Convention Hall

(Preprint 56-85)
Progress Report, Malleable Division Research Committee
A. H. Zrimsek, American Steel Foundries, Chicago; E. H. Belter and R. W. Heine, Univ. of Wis., Madison, Wis.

Annealing—Five-Day Week Basis
R. V. Righter, Central Foundries Div., General Motors Corp., Danville, Ill.

Consideration of Factors Governing Selection of Modern Malleable Heat Treating Equipment
Panel discussion by Controlled Annealing Committee (6-D). Fred Jacobs, Texas Foundries, Inc., Lufkin, Texas, Chairman.

Sand

Room 9, Convention Hall

Evaluating Cereal Core Binders
E. C. Zuppann and H. Putz, Oliver Corp., South Bend, Ind.

(Preprint 56-168)
Some Considerations on the Tensile and Transverse Strength Testing of Shell Mold and Core Sands
P. J. Ahearn and F. Quigley, Watertown Arsenal, Watertown, Mass., and J. I. Bluhm and J. F. Wallace, Case Institute of Technology, Cleveland.

Some Observations on the Transverse Test at Elevated Temperatures for Molded Sand Mixtures
D. C. Williams, Ohio State University, Columbus.

P. J. Ahearn

F. Quigley

Brass and Bronze

Room 11, Convention Hall

Fluxing and Deoxidation Treatment for Copper
M. G. Neu, Foundry Services (Overseas) Ltd., Birmingham, England and J. E. Gotheridge, Foundry Services, Inc., Columbus, Ohio.

Gas Porosity in Oxygen-Free Copper Castings
D. V. Ragone, University of Michigan, J. K. Sprinkle, Virginia Polytechnic Institute, H. F. Taylor and C. M. Adams Jr., Massachusetts Institute of Technology.

J. I. Bluhm

▪ 5:30 pm

Registration and exhibits close

▪ 7:00 pm

Non-Ferrous Founders' Society Annual Dinner

Rose Room, Marlborough-Blenheim Hotel

▪ 8:00 pm

Gray Iron Shop Course

Rose Room, Traymore Hotel

Cupola Operation
Sam F. Carter, American Cast Iron Pipe Co., Birmingham, Ala.: **Basic Cupola Operation.** M. H. Horton, Deere & Co., Moline, Ill.: **Water-Cooled Cupola Operation.** H. E. Henderson, Lynchburg Foundry Co., Lynchburg, Va.: **Acid Cupola Operation with Water-Cooled Tuyeres and Hot Blast.**

J. F. Wallace

D. C. Williams

D. V. Ragone

J. K. Sprinkle

H. R. McCurdy

■ *Friday, May 4*

▪ 7:30 am

Author-chairman breakfast
Diamond Room, Shelburne Hotel

▪ 8:30 am

Registration opens

▪ 9:00 am

Exhibits open

▪ 9:00 am

Brass and Bronze
Room 11, Convention Hall

(Preprint 56-1)
Age-Hardening Characteristics of a Cast Alloy of Copper—5.8 Per Cent Titanium
N. P. Hehner, H. McCurdy, and R. E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia.

(Preprint 56-3)
Application of Radiography in Manufacture of Bronze Castings
N. A. Kahn, S. Goldspiel, and R. R. Waltien, New York Naval Shipyard, Brooklyn, N.Y.

Gray Iron
Room 13, Convention Hall

(Preprint 56-22)
Hot-Blast Cupola Practice
W. L. Heinrichs, Fried. Krupp, Essen-Bredeney, Germany.

(Preprint 56-33)
Development of Hot-Blast Cupola Melting Technique in Europe
Ernst Loebbecke, W. Strikfeldt & Co., Rhineland, Germany.

Malleable
Room 1, Convention Hall

(Preprint 56-84)
Comparison of Liquid and Air-Quenched Pearlitic Malleable Irons
Report of Pearlitic Malleable Committee, R. W. Heine, University of Wisconsin, Chairman.

Welding of Castings
Report of Joint AFS–AWS Committee

The Nucleation of Graphite During the Decomposition of Cementite
E. G. Haney, Aluminum Co. of America, New Kensington, Pa., and M. F. Hawkes, Naval Ammunition Dept., Oahu, T.H.

R. E. Edelman

Pattern

Room 2, Convention Hall

(MODERN CASTINGS, May)
Use of Epoxy Resin as Pattern Material
E. J. McAfee, Puget Sound Naval Shipyard, Bremerton, Wash.

Opportunities and New Developments for the Patternmaking Industry
M. K. Young, U. S. Gypsum Co., Chicago

N. A. Kahn

▪ 12:00 noon

Joint Malleable and Gray Iron Round Table Luncheon

Belvedere Room, Traymore Hotel

(Preprint 56-81 and MODERN CASTINGS, May)
Malleable Base Spheroidal Iron
F. B. Rote, E. J. Chojnowski, and J. F. Bryce, Albion Malleable Iron Co., Albion, Mich.

Brass and Bronze Round Table Luncheon

Rose Room, Traymore Hotel

New Horizons in Copper Base Alloy Founding

S. Goldspiel

Education Round Table Luncheon

Kerry Hall, Shelburne Hotel

Tomorrow's Foundryman
L. J. Fletcher, Caterpillar Tractor Co., Peoria, Ill.

▪ 2:30 pm

Light Metals

Room 13, Convention Hall

(MODERN CASTINGS, May)
Centrifugal Casting of Unusual Shapes in Non-Ferrous Alloys
J. P. Krishon, Centr-O-Cast & Engineering Co., Detroit.

Machinability of Aluminum Die Castings
D. L. Colwell and Oldrich Tichy, Apex Smelting Co., Cleveland.

Novel Aluminum Engine Die Castings
E. N. Jacobi, Briggs & Stratton Corp., Milwaukee, Wis.

R. R. Waltien

E. J. McAfee

Plant and Plant Equipment

Room 11, Convention Hall

(Preprint 56-101)
Method of Melting Malleable Iron with Combination of Pulverized Coal and Oil
E. H. Nielsen, The Whiting Corp., Harvey, Ill.

(Preprint 56-102)
Recent Development of Coreless Line Frequency Induction Melting Furnace in European Foundries
Otto Junker, Otto Junker GMBH, Lammersdorf, Aachen, Germany. Presented by Manuel Tama, Ajax Engineering Corp., Trenton, N.J.

F. B. Rote

Sand

Room 9, Convention Hall

(Preprint 56-151)
Molding Sands, Molding Methods, and Casting Dimensions
R. W. Heine, University of Wisconsin.

(Preprint 56-152 and MODERN CASTINGS, January)
Does Sand Testing Give Us the Facts?
R. W. Heine, University of Wisconsin, E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati.

(MODERN CASTINGS, April)
Jolt Test for Sand
R. W. Heine, University of Wisconsin, E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati.

E. F. Chojnowski

Gray Iron Shop Course

Room 21, Convention Hall

Selection of Materials for Gray Iron Melting
R. A. Clark, Electro Metallurgical Corp., Div. Union Carbide & Carbon Co., Detroit.

▪ 5:30 pm

Registration and exhibits close

J. P. Krishon

▪ 7:30 pm

Annual Banquet
American Room, Traymore Hotel

Efficiency Through Right Thinking
Speaker: Dr. Norman Vincent Peale

Presentation of AFS Gold Medal Awards and Honorary Life Memberships.

■ *Saturday, May 5*

Atlantic Coast Day

▪ 7:30 am

Author-chairman breakfast
Diamond Room, Shelburne Hotel

▪ 8:30 am

Registration opens

▪ 9:00 am

Exhibits open

Education
Room 10, Convention Hall

Training Needs for the Foundry Industry

Refractories
Room 2, Convention Hall

(MODERN CASTINGS, May)
Properties of Refractories Affect Air Furnace Bottom Service
C. C. Lawson and L. R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill.

Experiences with Basic Cupola Refractories and Molding
A. P. Alexander and Edw. Boywid, International Harvester Co., Memphis, Tenn.

Light Metals
Room 13, Convention Hall

Tensile Properties of Aluminum Silicon Magnesium Alloys and the Effects of Sodium Modification
R. C. Harris, S. Lipson, and H. Rosenthal, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia.

(Preprint 56-64)
An Evaluation of ZH62XA Magnesium Sand Casting Alloy
K. E. Nelson, The Dow Chemical Co., Midland, Mich., and W. P. Saunders, The Dow Chemical Co., Madison, Ill.

(Preprint 56-63)
Effects of Section Size Variations in a Test Casting on Properties of Some Mg-Al-Zn Alloys
W. E. Pearson, The Dow Chemical Co., Midland, Mich.

D. L. Colwell

E. H. Nielsen

R. W. Heine

E. H. King

J. Schumacher

R. Martin, Jr.

J. M. Barrabee

S. Lipson

Sand

Room 9, Convention Hall

(Preprint 56-169)
Cold Process for Resin-Coated Foundry Sands
J. E. Bolt, General Electric Co., Pittsfield, Mass.

Preliminary Evaluation of Fluid Coke as a New Molding Medium
G. R. Meyers and E. G. Gentry, Penola Oil Co., Detroit.

Factors Affecting Core Stickiness (Progress Report of Sand Division Committee 8-c-f)

12:00 noon

Exhibits close

Annual Lecture and Business Meeting

Rose Room, Traymore Hotel

President's Annual Address.
Bruce L. Simpson, National Engineering Co., Chicago.

Robert E. Kennedy Memorial Apprentice Contest Awards.

Election of Officers and Directors.

Charles Edgar Hoyt Memorial Lecture

Marketing Your Product.
S. C. Massari, National Engineering Co., Chicago.

2:00 pm

Exhibits open

3:00 pm

Brass and Bronze

Room 13, Convention Hall

Casting Defects Clinic.

Malleable Shop Course

Room 1, Convention Hall

Molding Methods for Malleable Iron
W. Tragarz, International Harvester Co., Chicago: **Green Sand Molding.** R. H. Greenlee, Auto Specialties Manufacturing Co., St. Joseph Mich.: **Dry Core Sand Method.** Medie Hakeman, John Deere Malleable Works, East Moline, Ill.: **Mold Blowing.** T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Co., Chicago: **High Pressure Molding.** C. F. Joseph, Central Foundry Div. General Motors Corp., Saginaw, Mich.: **Shell Molding.**

Industrial Engineering

Room 1, Convention Hall

(Preprint 56-53)
Practical Foundry Application of Statistical Quality Control
Ross Martin, Jr., Rich Mfg. Co. of Calif., Los Angeles.

Engineering, Cost, and Quality
J. M. Barrabee, International Harvester Co., Milwaukee.

■ **5:30 pm**

Registration and exhibits close

■ **7:00 pm**

Sand Division Dinner
Rose Room, Traymore

New Developments in Core Blowing
Arthur M. Clark, Ford Motor Co., Detroit

H. Rosenthal

■ *Sunday, May 6*

Registration closed all day

Exhibits closed all day

■ **12:00 noon**

Past Presidents' Luncheon
Chippendale Room, Traymore Hotel

K. E. Nelson

■ **7:30 pm**

Canadian Dinner
Rose Room, Traymore Hotel

■ *Monday, May 7*

■ **7:30 am**

Author-chairman breakfast
Diamond Room, Shelburne Hotel

W. P. Saunders

■ **8:30 am**

Registration opens

■ **9:00 am**

Exhibits open

Light Metals
Room 11, Convention Hall

Modifications in Vertical Gating Principles
K. R. Grube, R. M. Lang, and J. G. Kura, Battelle Memorial Institute, Columbus, Ohio.

W. E. Pearson

J. E. Bolt

(Preprint 56-62)
New Aluminum Permanent Mold Casting Alloys C335 and A356
R. C. Lemon and H. Y. Hunsicker, Aluminum Co. of America, Cleveland.

(Preprint 56-61)
New Aluminum Casting Alloy XA140 for Elevated Temperature Applications
R. C. Lemon and W. E. Sicha, Aluminum Co. of America, Cleveland.

Steel

Room 13, Convention Hall

Effects of Aluminum and Titanium Deoxidation on Cast Steel
R. D. Ahles, W. R. Nestle, C. H. Weight, and R. S. Zeno, General Electric Co., Schenectady, N.Y.

C. C. Lawson

(Preprint 56-171)
Charpy Impact Tests Reveal Mysteries of Hot Tears
C. F. Christopher, Continental Foundry & Machine Div. of Blaw Knox Co., East Chicago, Ind.

Some Aspects of Dust Suppression in Foundries (Exchange paper from the British Steel Castings Research Association, Sheffield, England)
C. M. Stoth, BSCRA

Sand

Room 9, Convention Hall

H. Y. Hunsicker

(Preprint 56-156)
Green Sand Casting Finish
R. F. Meader, Whitin Machine Works, Whitinsville, Mass.

Statistical Techniques for Classifying Foundry Sands
D. C. Ekey and John Leaman, Lebanon Steel Foundry, Lebanon, Pa.

Analysis of Factors Affecting Surface Finish of Gray Iron Castings
D. C. Ekey and R. L. Yard, Lebanon Steel Foundry, Lebanon, Pa.

Joint Plant, Plant Equipment and Air Pollution Session

Room 1, Convention Hall

W. E. Sicha

Available Control Equipment for the Foundry Cupola
John M. Kane, American Air Filter Co., Inc., Louisville, Ky.

Control of Make-Up Air in Industrial Plants (Slide Demonstration)
K. E. Robinson, General Motors Corp., Detroit.

▪ 12:00 noon

Light Metals Round Table Luncheon
Venetian Room, Ambassador Hotel

Gas In Light Alloys:
Methods and Apparatus for Measuring Gas Content of Melts
H. Rosenthal, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia.

Application of Degassing Methods to Production
W. A. Mader, Oberdorfer Foundries, Inc., Syracuse, N.Y.

Production Results and Casting Quality
B. J. Alperin, Erie Foundries, General Electric Co., Erie, Pa.

R. D. Ahles

AFS Board of Directors Luncheon

Board Room, Claridge Hotel

2:30 pm

Heat Transfer

Room 1, Convention Hall

(Preprint 56-43)
Temperature Drop in Pouring Ladles
V. Paschkis, Columbia University, N.Y. (Progress Report on AFS-sponsored Research Work)

The Risering of Nodular Iron.
R. C. Shnay and S. L. Gertsman, Dept. of Mines & Technical Surveys, Ottawa, Ont., Canada.

W. R. Nestle

Gray Iron

Room 13, Convention Hall

(Preprint 56-27)
Influence of Temperature on Mechanical Strength of Coke
John Varga, Jr. and H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, Ohio.

(MODERN CASTINGS, May)
Use of Pig Iron in Foundries with Particular Attention to Specifications, Costs, Residual Elements, and "Heredity"
H. W. Lownie, Jr.

Compressive Strength of Coke
D. E. Krause and E. A. Lange, Gray Iron Research Institute, Columbus, Ohio

C. H. Weight

Sand

Room 9, Convention Hall

(Preprint 56-162)
The Carbon Dioxide Process (Official Exchange Paper of The Institute of British Foundrymen)
D. V. Atterton, Foundry Services, Ltd., Birmingham, England.

(Preprint 56-164)
Coremaking with CO_2 Process
F. M. Scaggs, Oklahoma Steel Castings Co., Tulsa, Okla.

Progress Report of Core Test Committee (8-C)

R. S. Zeno

C. F. Christopher

R. F. Meader

David C. Ekey

John Leaman

Education
Room 10, Convention Hall

Chapter Educational Activities
H. E. Gravlin, Claude B. Schneible Co., Detroit.

Panel Discussion—Responsibilities of Chapter Educational Chairmen.

5:30 pm

Registration and exhibits close

7:30 pm

Alumni Dinner
Belvedere Room—Traymore Hotel

8:00 pm

Metallography for the Foundryman
Rose Room, Traymore Hotel

Good Metallographic Practice
A. M. Montgomery, Aluminum Co. of America, Cleveland.

Metallography of Aluminum and Its Alloys
L. F. Mondolfo, Illinois Institute of Technology, Chicago.

Metallography of Magnesium and Its Alloys
M. E. Brooks, The Dow Chemical Co., Bay City, Mich.

Sand Shop Course
Trimble Hall, Claridge Hotel

What Sand Mixture Shall I Use?
Panel members: H. W. Meyer, General Steel Castings Corp., Granite City, H. F. Taylor, Massachusetts Institute of Technology. R. F. Meader, Whitin Machine Works, Whitinsville, Mass. W. G. Parker, General Electric, Elmira, N.Y.

Tuesday, May 8

7:30 am

Author-chairman breakfast
Diamond Room—Shelburne Hotel

8:30 am

Registration opens

9:00 am

Exhibits open

▪ 9:00 am

Heat Transfer

Room 1, Convention Hall

(Preprint 56-41)
Heat Flow in the Transient State
V. Paschkis, Columbia University, New York.

Solidification Phenomena
W. S. Pellini, Naval Research Laboratory, Washington, D.C.

Heat Treating Fundamentals
W. J. Childs, Lafayette College, Easton, Pa.

Industrial Engineering

Room 10, Convention Hall

(MODERN CASTINGS, May)
Basic Cost Concepts for the Small-Medium Foundry
A. C. Sinnett, Terre Haute Malleable & Mfg. Co., Terre Haute, Ind.

Incentives in a Small Jobbing Foundry
C. C. Erhart, Jr., Chris Erhart Foundry & Machine Co., Cincinnati.

Pattern

Room 2, Convention Hall

Metal Pattern Equipment
O. C. Bueg, Arrow Pattern & Engineering Co., Erie, Pa.

Gray Iron

Room 13, Convention Hall

(Preprint 56-23)
Sub-Surface Blowholes in Gray Irons and Their Association with Manganese Sulphide Segregation
W. G. Tonks, British Cast Iron Research Association, Birmingham, England.

(Preprint 56-25
Heat Treatment of Gray Cast Iron
J. B. Peck and A. H. Rauch, Deere & Co., Moline, Ill.

Causes and Effects of the Grain Size in Lamellar Gray Irons (Official French Exchange Paper from Association Technique de Fonderie)
Michel Ferry and Jean-Claude Margerie, Centre Technique des Industries de la Fonderie, Paris.

▪ 12:00 noon

Noise Control Round Table Luncheon

Kerry Hall, Shelburne Hotel

(Preprint 56-144)
Legal Aspects of the Noise Problem
F. E. Frazier, National Association Mutual Casualty Cos., Chicago.

Pattern Round Table Luncheon

Surf Room, Ambassador Hotel

Patternmaking—Man to Man
Ralph L. Lee, Lee Hobby Foundry, Birmingham, Mich.

Industrial Engineering Round Table Luncheon

Belvedere Room, Traymore Hotel

R. L. Yard

John Vargo

A. C. Sinnett

J. B. Peck

A. H. Rauch

F. E. Frazier

H. F. Taylor

C. M. Adams

The Human Factor in New Equipment
John Taylor, Norris & Elliot, Inc., Columbus, Ohio.

President's Luncheon for Exhibits Committee
Mandarin Room, Traymore Hotel

▪ 2:30 pm

Fundamental Papers
Room 9, Convention Hall

Metal Solidification in a Flowing Stream
M. C. Fleming, MIT; E. E. Hucke, Univ. of Mich.; C. M. Adams, Jr., MIT.

A New Method for Determining the Effect of Solidification Range of Fluidity
D. V. Ragone, Univ. of Mich.; C. M. Adams, Jr., and H. F. Taylor, MIT.

Steel
Room 13, Convention Hall

(MODERN CASTINGS, May)
Eliminate Grinding—Lower Cost of Cleaning Operations
F. Newberry, Oklamoma Steel Castings Co., Tulsa, Okla. Okla.

(Preprint 56-177)
Inorganic Binders Solve Shell Molding Problems
Jose Navarro and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Anionic or Cationic Agents—A Solution to Sand Problems
G. J. Vingas and A. H. Lewis, Dominion Engineering Works Ltd., Montreal, Canada.

Noise Control
Room 1, Convention Hall

Foundry Noise Control—A Demonstration
F. A. Patty, General Motors Corp., Detroit.

Typical Foundry Noise Exposures
Edward G. Meiter, Employers Mutual Liability Insurance Co. of Milwaukee, Wis.

The Mechanics of Hearing and Hearing Loss in Noise Deafness
A. L. Goldner, M. D., Flushing, N. Y.

Panel Discussion—Short Case Histories in Foundry Noise Control
A. L. Cudworth, Liberty Mutual Insurance Co., James Botsford, Bethlehem Steel Co., E. L. Lund and W. O. Hansen, Allis-Chalmers Mfg. Co. La Crosse, Wis.

▪ 5:30 pm

Registration and exhibits close

▪ 7:00 pm

Management Dinner
Rose Room, Traymore Hotel

Air Pollution, A Community Relations Problem

(Preprint 56-142)
Dr. E. M. Adams, The Dow Chemical Co., Midland, Mich.

▪ 8:00 pm

Metallography for the Foundryman
Rose Room, Traymore Hotel

Ferrous Metallographic Practice
P. C. Rosenthal, Univ. of Wis., Madison, Wis.

Metallography of Copper and Nickel-Base Alloys and Stainless Steels
J. J. Connelly, American Brake Shoe Co., Mahwah, N.J.

Management of a Metallographic Laboratory
Walter W. Edens, Allis-Chalmers Mfg. Co., Milwaukee.

Sand Shop Course
Trimble Hall, Claridge Hotel

Eliminating Sand Pile Blues
Panel Members—Ray Olson, Production Pattern & Foundry Co.; Charles W. Mooney, Jr., Olney Foundry Div.; and Edward H. Berry, Dodge Steel Co.

■ *Wednesday, May 9*

▪ 7:30 am

Author-chairman breakfast
Diamond Room, Shelburne Hotel

▪ 8:30 am

Registration opens

▪ 9:00 am

Exhibits open

Joint Gray Iron, Plant, and Plant Equipment
Room 11, Convention Hall

(Preprint 56-103)
Casting Tolerances as Affected by Automation in the Machine Shop
E. L. Buchman, Cleveland Foundry, Ford Motor Co., Cleveland.

(MODERN CASTINGS May)
Blow-Hot Press Automatic Shell Molding Machine
R. S. Amala, J. H. Smith, A. L. Boegehold, and R. F. Thomson, General Motors Corp., Detroit.

Movie: Techniques for Tomorrow.

Steel
Room 13, Convention Hall

Frank Newberry

Jose Navarro

A. H. Lewis

F. A. Patty

E. R. Lund

Bentonite—Properties and Composition (Their Relation to Casting Defects)
Wm. D. Emmett, Los Angeles Steel Casting Co., Los Angeles.

Removal of Gases from Molten Steel (Progress Report on AFS-Sponsored Research)
Clyde H. Wyman, Burnside Steel Foundry Co., Chicago.

(MODERN CASTINGS, May)

Ceramicast Process for Steel Castings
D. C. Ekey and E. G. Vogel, Lebanon Steel Foundry, Lebanon, Pa.

Sand

Room 9, Convention Hall

E. M. Adams

(Preprint 56-186)
Influence of Sand Distribution and Surface Coatings on Metal Penetration
Report by Sand Division Mold Surface Committee—8-H.

(MODERN CASTINGS, May)

Casting Finish, Precision and Tolerance
C. A. Sanders, American Colloid Co., Chicago.

Ventilation and Safety Session

Room 1, Convention Hall

Foundry Ventilation
J. G. Liskow, American Air Filter Co., Louisville, Ky.

E. L. Buchman

Aluminum Therapy
J. W. G. Hannon, McIntyre Research Foundation

Movie—Dust Control on Pedestal Grinders—Dust Control on Saving Frame Grinders

AFS Safety Training Course
R. A. Oster, Beloit Vocational and Adult School

▪ 12:00 noon

Steel Round Table Luncheon

Embassy Salon, Ambassador Hotel

What's New with Snotters and Other Steel Foundry Problems

C. A. Sanders

▪ 3:00 pm

Registration closes

▪ 5:30 pm

Exhibits close
60th Castings Congress and Exhibit closes.

BANQUET SPEAKER

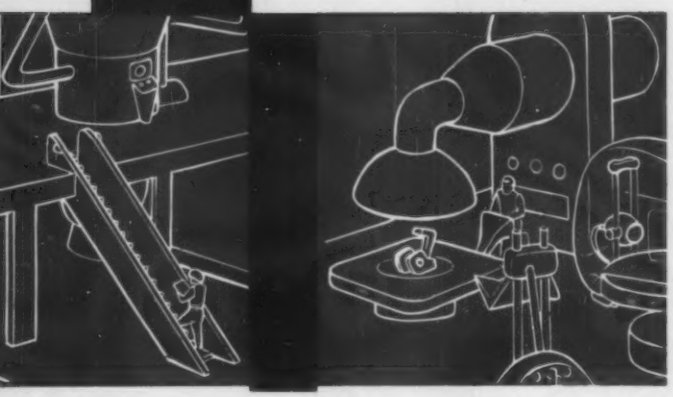
Norman Vincent Peale

"God's salesman," is what some have called Dr. Norman Vincent Peale, pastor of the nation's largest Protestant congregation, author of a best-selling book, editor, writer, and listed as one of America's twelve master salesmen. Like a practical businessman, he adapts religion to meet the everyday needs of people, and millions have been reached by his messages. Dr. Peale does not resort to sensationalism and he is not an emotional evangelist. The real secret of his success appears to lie in a practical application of religion and in a keen understanding of human psychology.

Marble Collegiate Church, Peal's pastorate hardly seems the place for a spell-binding preacher; it is the nation's oldest Protestant congregation, being now in its 329th year. Men compose 60 per cent of the membership.

"Efficiency Through Right Thinking," the topic that Dr. Peale will present at the annual banquet of the American Foundrymen's Society, is typical of the topics that he brings before the public in showing his way to successful living. Dr. Peale may be the greatest living how-to-do-it-yourself Christian. His advice is invaluable to every-day people, every day of the week because he never forgets the *how to* part. He always takes the extra step and tells *how to* make contact with the infinite power through prayer, and *how to* apply this power to personal problems.

And now you will be able to find *how to* increase *your* efficiency through right thinking.



HOUR LECTURER

S. C. Massari

"Marketing Your Product" is your basic problem if you want to grow and S. C. Massari has a wide knowledge of many products. He has distinguished himself in professional, military and civic activities and was awarded the John H. Whiting Gold Medal of the American Foundrymen's Society in 1949.

Mr. Massari's industrial career began in 1924 when he graduated from Massachusetts Institute of Technology and started work as a metallurgist. He was engaged in production research until 1942 when he entered the armed services. Assigned to Army Ordnance, Massari supervised engineering and production of tanks and military vehicles. At the end of the war, he joined the staff of the American Foundrymen's Society as its technical director and served in that capacity until 1953. He is now director of research for National Engineering Co., Chicago.

Mr. Massari has appeared many times before the national, regional and chapter meetings of AFS. He has presented papers before other national technical societies and has written for the trade and technical press on the metallurgy of white and chilled iron, gray iron, cupola control and is author of the book *The Microstructure of Chilled Car Wheel Iron."*

Born in Chicago, Massari is now a resident and trustee of the Village of River Forest, a Chicago suburb.

GOLD MEDAL AWARDS

CHARLES C. SIGERFOOS

THOMAS W. PANGBORN GOLD MEDAL

"For outstanding contributions to the Society and the Castings Industry, particularly in the field of education of engineering students for foundry careers."

Professor Sigerfoos will be presented the first Thomas W. Pangborn Gold Medal in recognition of a career of service that has found him on the faculty of Michigan State University since 1935. His contributions to the Central Michigan Chapter, to the technical committees of AFS and to the Michigan Regional Foundry Conference are legion.

JAMES S. VANICK

WILLIAM H. McFADDEN GOLD MEDAL

"For outstanding contributions to the Society and for valuable service to the ferrous castings industry over a period of many years."

During Mr. Vanick's career as a research metallurgist for International Nickel Co. he authored the original work on his company's high nickel iron casting alloys. A member of 11 technical societies and author of 50 papers, his previous honors include a citation from the Gray Iron Founders' Society. He is a past chairman of the AFS Gray Iron Division.

HAROLD F. BISHOP

JOSEPH S. SEAMAN GOLD MEDAL

"For outstanding contributions in the field of castings research at the Naval Research Laboratories and for contributions to the Society."

Harold Bishop is author or co-author of over 60 published technical papers, all of which have been based on his researches at the Naval Research Laboratories where he has spent his entire career as a metallurgist. He now heads the melting and casting section at the Laboratories. Much of his work has appeared in AFS publications.

HONORARY LIFE MEMBERS

JOSEPH C. PENDLETON

"For outstanding contributions to the advancement of the art and sciences of metal castings, particularly in the field of naval architecture requirements."

J. C. Pendleton retired January 1, 1955, after serving three foundries for a total of 51 years. Inventor and pioneer in technical progress, Mr. Pendleton was also a molder of men and during his 25 years as superintendent of the foundry division of the Newport News Shipbuilding and Dry Dock Co. he trained a number of today's leading foundrymen.

WILLIAM D. McMILLAN

"For outstanding contributions to the Society and the ferrous castings industry."

Best known for his work in malleable iron, Mr. McMillan has devoted 33 years to metallurgical and chemical studies for the International Harvester Co. and is now supervisor of metallurgy. He is current chairman of the AFS Publications Committee, a past chairman of the AFS Chicago Chapter, and a past chairman of the Society's Malleable Division.

BRUCE L. SIMPSON

"On completion of his present term of office as President of AFS.

AFS President Simpson has been at the helm during a successful year that saw three new chapters sign on with the Society. The addition of these new chapters helped the Society's membership climb to a record high of over 12,000. Mr. Simpson served on the national board of directors and in several elective posts for the Chicago Chapter. He is the author of AFS book, DEVELOPEMENT OF THE METAL CASTINGS INDUSTRY.

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TERMS EXPIRE 1956

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W. R. Pindell, *Northwest Foundry & Furnace Co.*
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TERMS EXPIRE 1957

F. C. Cech, *Cleveland Trade School*
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B. G. Emmett, *Los Angeles Steel Casting Co.*
W. M. Hamilton, *Chattanooga Div., Crane Co.*
W. A. Morley, *Olney Foundry, Link-Belt Co.*
E. R. Oeschger, *General Electric Co.*
H. L. Ullrich, *Foundry Consultant*

TERMS EXPIRE 1958

C. C. Drake, *Griffin Wheel Co.*
H. C. Erskine, *Aluminum Co. of America*
C. W. Gilchrist, *Cooper-Bessemer Corp.*
O. Jay Myers, *Archer-Daniels-Midland Co.*
C. E. Nelson, *Dow Chemical Co.*
R. A. Oster, *Beloit Vocational and Adult School*
R. W. Trimble, *Bethlehem Supply Co.*

GLASS CLOTH GIVES OLD PATTERNS NEW LIFE

Here's how your pattern shop can repair beat-up patterns and make them better than new

TED L. ARZT / *President*
T. L. Arzt Foundry Co., Chicago

1 Roughed-up pattern is inspected by A. R. Jameson, Jameson Chemical Co., who developed pattern rehabilitation process, and author Ted Artz.

■ Glass cloth is teamed with an air drying chemical coating to rehabilitate damaged foundry patterns and to protect them from future damage. The coating material, aided by a catalyst, cures at normal temperatures and forms a film with chemical and abrasion resistance and hardness similar in many respects to a baked-type coating. Glass cloth is used to give added protection to surfaces receiving most abuse.

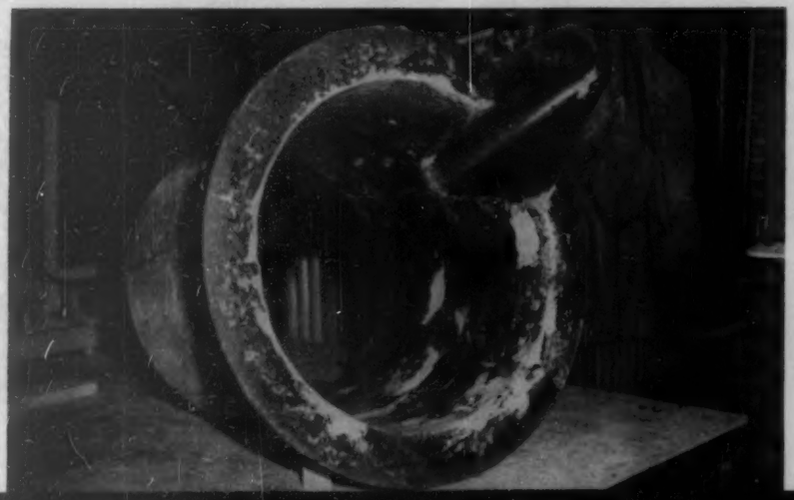
The damaged pattern is prepared for this treatment by removing scale and other matter with a wire brush or suitable implement and is cleaned of oil and grease with a solvent.

A primer coating, applied by brush or spray, penetrates the pattern to establish a firm footing. When a second coat becomes tacky precut pieces of glass cloth are placed on areas which take a beating. Brushing the cloth against the adhesive coated pattern helps to effect a tight bond while removing blisters.

When the cloth and second coat are dry to the touch, cloth edges are trimmed and the entire pattern is given a final coating.

Because rehabilitated patterns are impervious to water, they are washed after use in molding with household detergent before being returned to storage. These patterns are expected to remain in good shape through long storage and repeated use and to last longer than the original.

2 The pattern is cleaned by brush and solvent. Holes left by removing splinters from abrasions are filled with wooden blocks and plastic wood filler.

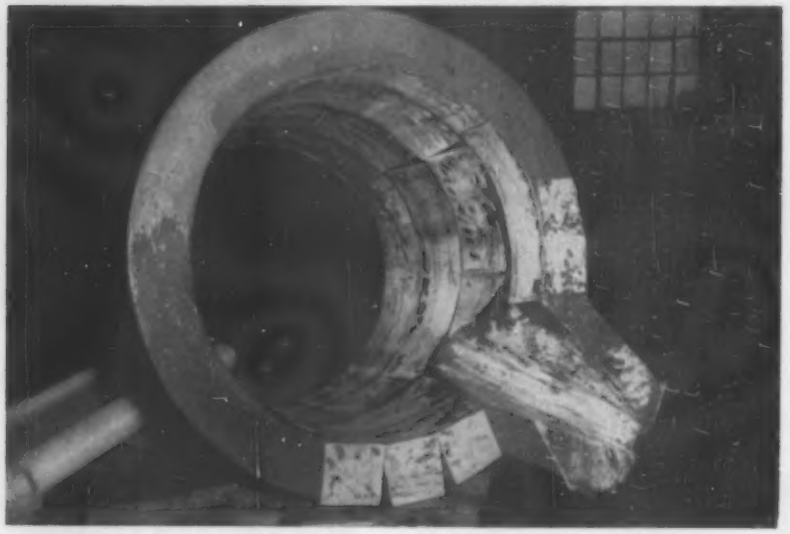


3 Glass cloth is laid out on a flat surface and cut by scissors, razor, or knife to fit over repaired areas of pattern subject to excessive wear.

4 A primer coating is allowed to dry about 45 min at room temperature. When the second coat becomes tacky glass cloth is laid on in sections.

5 Brushing helps glass cloth conform to the irregular shape of the pattern, removes blisters, and establishes a good bond for the reinforcement.

6 Rims and edges may be strengthened by glass cloth strip which is available, commercially, bound on both sides, in convenient 1½" wide rolls.



7 The edges of cloth patches may be trimmed with a knife, scissors, or razor when the second coat and the glass cloth become dry to touch.

8 Final spray or brush coat comes to full cure in 5 days; 12 hr after application, the process may be speeded by heating to 125 F for 8 hr.

9 Three-piece rehabilitated pattern has spherical, flat, and curved surfaces. Bowl-shape unit at right took 4½ hr of labor and about $5 material.

MANAGEMENT LOOKS AT THE FOREMAN

How do you select, train, evaluate your front line management team members?

The role of the foreman is a neglected aspect of foundry management. Because of this, a large portion of the 57th Annual Meeting of the National Foundry Association last October in Chicago was devoted to a panel discussion of this problem, a condensation of which is reprinted here. Panel members were C. A. Carolin, president, R. B. Carolin Foundry & Machine Co., Detroit; A. G. Hall, works manager, Nordberg Mfg. Co., Milwaukee; W. E. Jones, works manager, Josam Mfg. Co., Michigan City, Ind.; and J. D. McGill, Jr., personnel director, North Birmingham Pipe Plant. United States Pipe & Foundry Co., Birmingham, Ala.

Mr. Hall

■ What are we really looking for in a foreman? Or, put another way, how do we measure his effectiveness?

I believe that we measure his effectiveness and his results by the results of the group he supervises.

What are the personal qualifications that we look for in such a man?

Arthur G. Hall . . "the answer lies entirely with management in selection, training, and preparation they give their foremen."

First, a man must have sufficient technical know-how, possibly aided and supplemented by some staff assistance, to understand thoroughly all of the operations under his supervision.

Next, a foreman must have an appreciation of the problems of other foremen in other departments at his own level.

Third, he must be able to operate as a member of a team—his boss' team.

Fourth, he must be able to mold his workers into a smoothly operating team.

Where do we get supervisors to meet this brief list of specifications?

The time-honored and easiest way, of course, is to bring someone up from the ranks. The man you bring from the ranks has a knowledge of the work which has been going on in the department, of the organization in which he works, and he has, in some cases, an acceptance on the part of the men he is to supervise.

Some of the disadvantages of doing this are almost as obvious. I don't see why the mere act of taking off overalls and being given the title of foreman should endow a person with all the qualifications we look for in a foreman. Yet, many times, that is almost all that is done when a foreman is created. The answer to this problem lies entirely with management, in the selection, training and preparation they give such a man.

The other sources of foremen are either horizontal transfer or promotion from within the plant of someone who has been in production or technical work in the plant, going outside the organization to get people to train for foremen, or lastly the time-honored custom of stealing a foreman or supervisor from someone else.

This, too, has its advantages and disadvantages.

The disadvantages are that the know-how and knowledge of the plant does not exist in the outside man.

The advantage, however, is that you can screen the man quite carefully. If you are confining your selection from within the plant, you take what you have and sometimes make do, whereas if you are looking on the outside, you can be somewhat more critical.

The difference, it seems to me, is that the man you bring along from within the plant must be taught some of the elements of foremanship that come in the area of human relations, whereas the outsider must be taught the know-how of your particular operations.

How can we actually go about selecting and training such foremen? Here are several points.

The first is to start early. Do not wait until you have a vacancy. You never know when you are going to need a foreman these days.

Second, survey the people in your own ranks, people in all departments.

The business of rating or appraising people is a pretty well established technique. First, rate the performance of the man on his present job. Then, if you are thinking of him for promotion or development you have to think of him also in terms of potential. Third, particularly when you are looking for supervisors, consider the human relations abilities of the individual involved.

One method of doing this is to use multiple rating surveys and have the evaluation done by several people through what is known as "cross rating." In other words, have it done by his own supervisor, and have it done by other people in the plant so that you wash out personal likes and dislikes and get a pretty good evaluation. Even though you think you know the person well, the mere task of setting down on paper what you know about him and what you think about him and having several people do it independently will be quite enlightening in selecting candidates for promotion development.

The third point, and I think it should be explored whether you go outside or not, is to do some advertising, either blind ads or through professional societies, through management engineers or such pro-

fessional concerns, and in screening your applicants watch not only for a man for the actual job you have to fill but for those who might enter into training for supervisory positions.

Another source that sometimes is completely overlooked is union officials. A man has not become a union official in your plant without some degree of leadership qualifications. You will find that many have had their first training in leadership through union activities.

When you have gotten a fair sampling of candidates you should size them up pretty thoroughly. There are many procedures for doing this personality evaluation. The familiar batteries of personality tests developed since the war are one way, while another way is to consider the man's extra-curricular activities. Does he take on civic obligations, such as serving on school boards or church committees or Community Fund activities in his own neighborhood?

I believe it is becoming more and more important to explore the human relations angle of all supervisory candidates, and the clinical psychological interview has become a valuable tool, in my experience at least, in seeing what is behind the individual and how he might react under certain pressure situations. This should be done by professional industrial psychologists; it is not expensive and I think it is well worthwhile.

All of this testing should be done before you start any sort of training and those who do not measure up should be eliminated at this step.

I think we should start training early and make it formal. Make it a classroom sort of thing. There are classes going on in your neighborhood, conducted by local schools or professional societies, where your man can get the advantage of formal training.

What should they have in this formal training? The training-within-industry program developed during World War II is a good springboard from which to start. It did accomplish a job and can be used as background material for training. We want to teach these people to do things: work simplification; how to discipline workers; how to interview workers; safety; quality; the budgeting of a man's own time; budgeting the supervisor's own time so he is not spending all of it with his head down in a mold but does some thinking about other things; the matter of meeting production schedules. All of those areas of training could be done on a fairly formal basis. In a large plant they could be covered on a classroom basis and in smaller plants by the use of all the outside training facilities available.

Another facet of this training is to broaden these people. Bring them to meetings such as this, even if they are only trainees, and let them get in on other professional society meetings, chapter meetings of the American Foundrymen's Society and the like.

After you have brought your trainee along in this sort of program it seems to me it is only fair, both to you and to him, to try him out so far as you can. Let him substitute during vacation or sickness for the regular foreman. Give him special assignments, such as being a sort of project man on a big contract. Let him go out with the salesman on customer complaints. Let him get into the operation of the business as a whole. Teach him and bring him into the economics, not only of your own company, the profit and loss statement and that sort of thing, but explain to him the elements of national economics.

When you finally decide to make him a foreman, make him one wholeheartedly. In other words, make him a part of management. If possible, let foremen have their own washroom. Let them have a special place in the parking lot. Let them attend union negotiation meetings, possibly in the role of unofficial secretary. Let them understand the sort of data necessary in dealing with the unions.

What should you pay this new supervisor?

A simple answer is to pay him enough so he doesn't have to worry about his pay. A rule of thumb used by many firms is that he should be paid a certain percentage over the maximum earnings of the highest paid mechanic in his group. Another point that has to be watched very carefully is the matter of overtime for the foreman. You can't have a foreman on a salary basis, perhaps without any overtime provision, coming up at the end of the month or year with less total earnings than the highest paid mechanic in his group.

Mr. Jones

There is no doubt that we are awakening to a new conception of foremanship, a new type of departmental manager. The men in the shop may recognize that the foreman is a pusher but they also must respect him for being fair, showing no partiality, insisting on quality workmanship. For this reason, a new foreman must be a human engineer as well as a technical man.

Today, the real answer to the problem of increased competition is increased efficiency. Reduction in standards or costs is only a condition of the might of the manager, and his success in obtaining his objective lies in the ability to obtain the cooperation of the foreman in the performance of his duties with the company.

We have found the answer by having daily meetings with small groups on topics pertaining to their responsibilities. In these discussion we have an opportunity to plant a thought or idea with enough emphasis that the foreman remembers to apply the point at every opportunity. We instruct our foremen. We do not tell the men; we show them.

The foreman of today is not self-sustaining as he was in the so-called old days when the molder foreman was the final word. Today he must feel he has at all times the support of his supervisors not the feeling that he has the union on one side and the company on the other.

The foreman should be close enough to his men to know each individual's limitations. The desire to be a supervisor is the first requirement of a foreman; the ability to follow all instructions tactfully is the way to his success.

The foreman's success doesn't depend as much on his trade skill as it does on his management, on his ability to schedule work, his close observation of the individual talents of his men, and on his training and on producing workers who will produce and maintain the company's standards of quality.

The successful foreman will continue to find new ways to present the daily, routine problems and be able to determine the difference between telling, showing and instructing.

There are many ways of giving the foreman a sense of belonging to the company and a sense of security on his job. One of the most effective is to provide him with all the information he needs and the kind of close cooperation that we as managers can often give.

Mr. McGill

I'd like to talk about the foreman as management. In fact, to his employees, the foreman *is* management and *is* the company. I'd like also to touch on a few of the obligations that we of middle or top management have to our foremen, and in turn some of the obligations they have to us.

I think the average industrial employee is often woefully ignorant about the philosophies and the policies of the company for which he works.

In too many cases, most of the

W. E. Jones . . "foremen must have management's support, not feel that the union is on one side, the company on the other."

discussions he hears about company policies and philosophies are at the union hall, in the locker building, or down at the local beer parlor where the least efficient and most disgruntled guy in the shop, after having one beer too many, is popping off about how he has been mistreated by the company.

With the exception of very small companies where there is the opportunity of a close association between the president of the company, the personnel director, and the plant manager and his employees, most shop folks have little opportunity to talk with people like that on an informal, personal basis.

The man the shop employee sees the most of, and with whom he talks the most (and who should be the easiest to talk with), is his foreman. The clearest picture that the average man in the shop gets of the company and of the management attitude of the company is through his foreman: the way his foreman acts, the way his foreman talks, and specifically the way his foreman treats him. If the foreman raises hell and threatens to fire everybody if they don't get on the ball, then the company must feel the same way.

J. D. McGill, Jr., . . "clearest picture the average shop man gets of the company and management is through his foreman."

On the other hand, if the foreman is just in his dealings with his employees, avoids favoritism, and obviously tries to do what is right, then the company is fair and just and a good outfit to work for. I think, this being true, that it is vitally important just how a foreman represents a company to his employees. The productive efficiency of the employees, their job satisfaction, morale and ability to work safely are directly affected by their belief in the company, their attitude toward it, and their desire not just to work *for* the company but to work *with* the company.

Naturally, we desire that our foreman represent **management** well and exactly as management wants to be represented. We expect our foremen to do a good job in regard to production, quality, lower costs, etc. But do we as middle and top management do our part to make those things possible? We have certain definite responsibilities to our foremen.

First of all, we must consider our foremen as a part of management and not just as errand boys who carry scratch pads around to jot down instructions from the front office.

Second, we must make foremen honestly believe that they are important members of the management team; that can be done only by our attitude and our actions toward them.

Third, we must take the necessary steps to see that our foremen know the company's philosophies and policies, understand the thinking behind them, and how to apply them properly in all types of situations.

Fourth, we must make our foremen responsible for the operation of their departments, and let them know this.

Fifth, we must give our foremen the necessary authority to do their jobs effectively—authority commensurate with their responsibility, authority which they know they have and which their employees know they have.

Sixth, we must select, train, pay and treat our foremen in such a manner that everyone knows we consider our supervisory positions important and our foremen as key men in our organization.

This is a two-way street, however. Our foremen have an equal responsibility to the top management of the company. In looking at them as the representatives of management on the firing line, I think there are six specific things that we have the right to expect from our foremen.

First, our foremen must be loyal to the company at all times, actively supporting company thinking, plans, policies and programs—selling them and not opposing them or just passively supporting them.

Second, our foremen must keep higher management informed at all times of the problems on the firing line—potential problems as well as existing problems. I mean problems of production, quality, labor relations, and every other kind.

Third, our foremen must be absolutely honest with higher management, **frankly and openly** stating their views on production problems, proposed **changes** in methods, equipment and processes, labor relations problems, etc., and not just what the boss wants to hear.

Fourth, our foremen must accept the responsibility that is given them, willingly, freely and with a keen sense of obligation.

Fifth, our foremen must accept the authority that is given them and exercise it in the proper manner.

Sixth, our foremen must always remain aware of the fact that to their employees they are management and the company is being judged every day by their words and by their actions.

Mr. Carolin

It is my firm contention that all of the other requirements are of little value unless loyalty is contained within the foreman. I also feel that this isn't something that the foreman gives but something which the company, through its officials and its key personnel, really earns.

A graduate metallurgist is not necessary, but a foreman with a general over-all **knowledge of** foundry practice is definitely advantageous. He should have a working knowledge of metallurgy, otherwise he won't know when the wool is being pulled over his eyes if he happens to be a general foreman.

Encourage your foremen to increase their technical knowledge. You can never get enough of it.

Diplomacy is a must in this day and age. The bull whip is gone. A supervisor, particularly a foreman, today must listen, be attentive, hold his temper, give instructions quietly but firmly, and refer disagreements through the grievance procedure in writing.

To get a foreman with all these qualities, we find, is a continuous program. Our method involves all the key personnel in our organization. Every one is a teacher and a student at the same time.

We have decided the foreman has to be a real member of the management team. He comes into all of our executive meetings. He sits in on management affairs and learns a little bit of the problems surrounding purchasing and sales. General administrative problems and profit and loss statements are brought up and discussed.

Questions and Answers

Mr. Hall: You find so many foremen who have the old top sergeant technique. They feel they must be able to whip everyone in the outfit before they can be foreman; that they have to be able to do every job in the shop better than the one doing it. In modern industry that is not possible.

There is a growing tendency in industry, and I'm sure some of you have seen it, to take graduates from some of the smaller classical colleges, where they give B. A. degrees, bring them into the organization, in purchasing, sales assistants, lab assistants, all sorts of odd jobs, to get into the swing of the thing, and then gradually put them into supervision. More and more firms are finding that this type of person, with the necessary human relations traits, can pick up the technical know-how without knowing the detail of how to play every position on the team, and make an excellent foreman.

Mr. Jones: I can hardly agree.

I believe that the foreman of today should have thorough training

in one of the basic trades of the industry. He will make a much better foreman and save the company many dollars.

I have hired men from outside of town and better than 50 per cent of them only reflect some of my poor judgment. I have promoted many men from the ranks and very seldom make a mistake.

In the first place, when we bring a man in from outside of town, his friends, his family, his social connections have been built up through the years. He is coming in at a high salary. We can take a local man, make him a foreman, pay him 15 or 20 cents per hour more than he has been receiving on the job, and he will do everything possible to succeed.

Member: Mr. Jones, I agree with this business of bringing a man up from the ranks—we have had far greater success with that than in finding them on the outside—but how does he counter the union problem? This business of having been in the union and having absorbed the union philosophy?

Mr. Jones: The successful union committeeman is a man who would be eligible for supervision. There is no promotion available, so he shifts his talents over to the union and then, through study, continual attendance at meetings, and education, he becomes a foreman in the union.

I sincerely believe that the union committeeman who has been elected by the organization to represent them is a potential foreman in many cases and you will find that he is a pretty good pusher.

The only way a new man coming into an organization can make a hit with the men in the shop so to speak, is to be lenient, because as soon as he starts putting the pressure on they'll go after him—you know it and so do I.

Mr. McGill: We have consistently promoted from within and some of our best foremen today were once union leaders. They had shown good leadership and were good material. But I'd like in a friendly way to take issue with Mr. Jones on several points.

First of all, I disagree that in bringing a man from the outside, he has to be lenient in order to get along. If he is fair, if he shows he is just in handling his people, and if he deals firmly with them, I think he will gain their respect and you want that more than their liking.

I think we are lowering our standards sometimes in promoting from within because we are not demanding as much as we must have from our foremen.

Then a final point, I think that with automation coming and all that has happened in this whole field, we must have foremen as managers, not as skilled craftsmen.

Mr. Carolin: It has been my experience with the average foundry foreman that few have more than a high school education and usually considerably less. I have trained aproximately 30 foremen over a period of about 17 years.

One was an early leader in the Ford union long before it was recognized, a very good molder, but beyond that he had never acquired more than about third-grade education. He turned out to be a foreman ultimately, and only death let him out of the organization. This man later became one of the finest negotiators of labor contracts that we had in our organization.

This upgrading from the shop, in my experience, has been very successful and I don't think they have to have a great deal of formal education so long as they have the willingness to learn and management has the willingness to teach.

Member: Mr. Carolin, I think a lot hinges on the word "teach." We management people have to teach the candidates we choose to be foremen to be better foremen, and we are the teachers. Schools and night courses and all the reading that can be done will improve them, but we have to teach them to be the people we want them to be.

Member: One qualification we require, and perhaps some of you do, too, that hasn't been mentioned, a qualification needed in a foreman in my opinion, is that he be a teacher. Practically every molder except the oldtimers in our plant has been taught to be a molder by our foreman. We simply don't hire molders and coremakers any more.

Mr. Hall: Why should we pitch the foundry at the third-grade level? We will not take an apprentice into our foundry who has not completed high school, very satisfactorily, in the top quarter of his class. At least half of our foremen have one or more years of university. With all the free education in this country today there is no point in the foundry industry or any other industry working with third-grade students. If you are going to teach, teach people who already have a good amount of education and who have learned how to study and how to learn.

Member: If a choice came, Mr. Hall, of a man who had a lot of technical ability and not too good a reputation with his fellow worker, and there was another fellow who didn't know so much, would you select the man with not so much technical knowledge and leave the good man under him?

Mr. Hall: I'd take the man with the human relations know-how, for two reasons. Not only would he be doing a good job as a foreman, but I would be wasting the technical know-how of the other man, because the ratio of the amount of time spent on the technical part of the job as compared with the amount spent on the human relations part is far more than half the human relations side of the job.

I think you have to take the position that advancement into supervision is a one-way street, and set up the axiom "Once a foreman, always a foreman."

In slack times, I would much prefer make-work projects among the ranks of foremen rather than any other place. You cannot expect a man to be a full member of the management team—a point that was emphasized by all of the panel members—if he constantly has to keep one foot in the other bucket against the day he will be put back into the ranks. He will never come wholeheartedly to your side. If you are going to make him a foreman, for heaven's sake make him one and keep him there. Don't put him back in the ranks.

Mr. McGill: I'd like to back up Mr. Hall on this. We have had some very definite problems in our plant about that, where our business has been up and down in peaks and valleys. We found, particularly in our casting department which is the heart of the operations, that in some cases where we have promoted men from the ranks they have done a good job but are constantly living in fear of the day when they will have to step back due to a reduction in force.

Member: Mr. Hall, could you tell me the percentage of your apprentices that you have advanced to the position of foremen or superintendents, or what benefits you get from the indentured apprentice?

Mr. Hall: The percentage is quite high—I don't have the figures at my finger tips—not only of foremen and superintendents in the manufacturing end of the business, but such things as managers of erection of our equipment in the field, assistant chief engineers, etc. Many of those are graduates of our apprentice system. I would venture to say that of the apprentices who graduate from our system we hold in our organization over the years on an average between 50 and 75 per cent, and of that 50 or 75 per cent, ten per cent go into some more advanced position.

C. A. Carolin . . "method in our organization involves every key person. Everyone is teacher and student at the same time.

R. W. HEINE / *Associate Professor*
University of Wisconsin

E. H. KING / *Vice-President*
Hill & Griffith Co., Cincinnati

J. S. SCHUMACHER / *Chief Engineer*
Hill & Griffith Co.

NEW TEST FOR BETTER MOLDING PRACTICE

■ The best molding sand, the best molding machine and the best molding practices for your job—these are facts that can be determined by a sand test that *does* give us the facts: the jolt test for molding sands and molding machines.

Differences in the response of molding sands to jolt molding can be measured with this test. Through mold hardness and density measurements, the jolt test is capable of revealing the effects of sand type, moisture content and additives or jolt compactability, or flowability. Through a further step, results may be correlated with green sand properties.

The jolt test is performed on the common jolt molding machine using a few accessories to form the sand sample. A section view of the sand sample tube and cup is shown in Fig. 1a. The sample container consists of a hollow steel or brass tube 2.0 in. ID, 2.375 in. OD, 12 in. long.

The tube is sealed in a base cup the same size as used for the specimen tube of the standard AFS sand specimen. The base cup rests on a steel block 2 x 4¼ x 4¾ in.

Tube, cup and block are assembled on the jolt table of the machine as shown in Fig. 1b and the tube is filled to overflowing with molding sand that has been put through a 6 mesh riddle. It is then rapped with a small mallet three or four times at each quadrant at a height of 4 in. from the bottom of the tube.

The tube is then refilled and struck off, producing a specimen that consists of a sand column 12 in. long x 2.0 in. diameter.

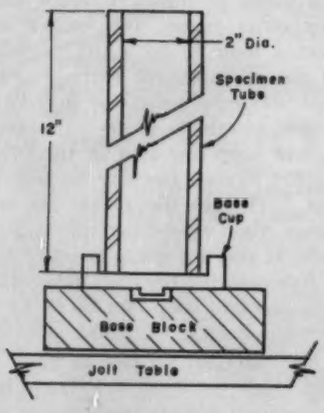


Fig. 1a and 1b . . Simple equipment used for making new jolt test. Insert in tube gives flat side for measuring hardness.

JOLT TEST DATA*

No. Jolts	Mold Hardness	Sand Column Height, inches	Average Sand Density lb/cu ft
	For 12" high tube		
0	--	12.0	48.3 — initial
5	54	8.94	64.9
10	69	8.125	71.5
20	79	7.50	77.5
35	86	7.125	81.6
50	88	6.875	84.5 — final
Weight of sand	501 gms		
	For 6" high tube		
0	--	6.0	48.3 — initial
6	49	4.25	68.2
11	70	3.875	74.8
21	77	3.625	79.9
36	81	3.50	82.8
52	82	3.375	85.8 — final
Weight of sand	250 gms		

* For a four screen, 89 AFS fineness number, bonded with 8.0% western bentonite at 3.2% H_2O, no additions, the particular specimen tube was 2.0468 inches ID x 12.0 inches long.

Reproducibility of the weight of sand in the column is within 2% for the authors' technique.

The tube is then jolted five times on the molding machine and the sand settles in the tube. The distance from the top of the tube down to the sand level is measured, and subtracted from 12.0 in. to obtain the height of the sand column after five jolts. The tube is then removed from the cup and several mold hardness readings are taken on the bottom sand surface.

Occasionally, the first five jolts will not prevent the specimen from sliding in the tube when the hardness measurement is taken. Force applied to the top side of the specimen will prevent movement.

The tube is then replaced in the cup and jolted about five more times. Measurements are repeated, and data taken at about 5, 10, 15, 20, 30 and 40 jolts. Finally, the sand is removed from the tube and weighed so that density can be calculated. The test may be repeated with a 6 in. sand column to simulate a shallow flask.

A sample set of data from the test is presented in the table and are shown graphically in Fig. 2. Figure 2 shows that increasing the number of jolts causes a progressive increase in mold hardness and average density. However, after about 30 jolts mold hardness and average density values reach a level where further jolting produces only minor improvements. Figure 3 also reveals that hardness is lower and average density is higher for a 6 in. sand column than for a 12 in. sand column for this particular sand.

The lower hardness at the base of the 6 in. sand column means that the density is also lower at the column base. Likewise, the higher hardness at the base of the 12 in. column means that the density is higher at the column base. However, the 6 in. column has a higher average density than the 12 in. column because there is less density gradient from top to bottom in the former. The greater density gradient in the 12 in. column is due to the greater amount of internal friction of sand grains in the longer column. With another sand of better response to jolt molding (higher flowability) the 12 in. column

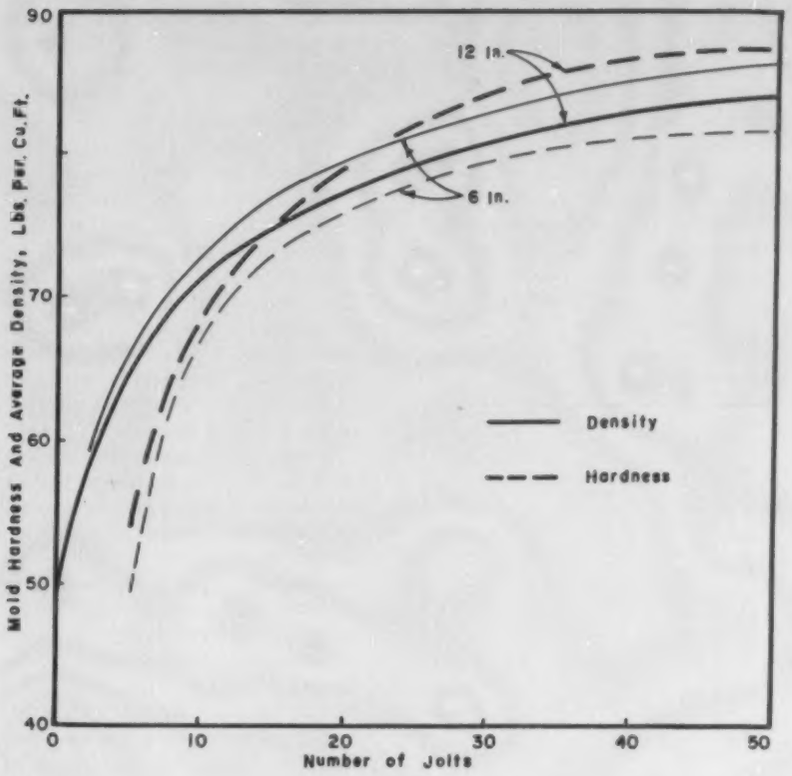


Fig. 2 (left) . . Density and hardness reach maximum after repeated jolting of both the tall and short specimens.

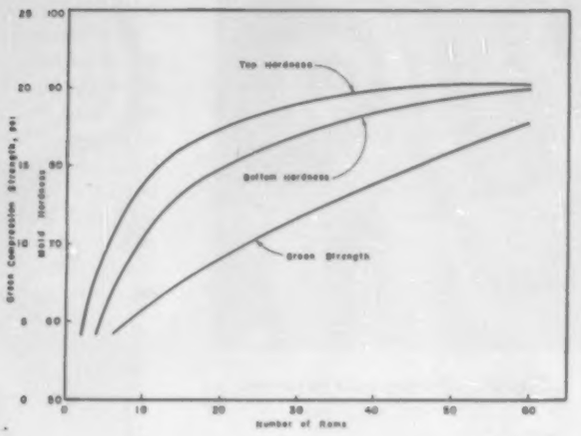


Fig. 3 (right) . . Green strength-mold hardness relation for sands shown in Fig. 2 and in the table.

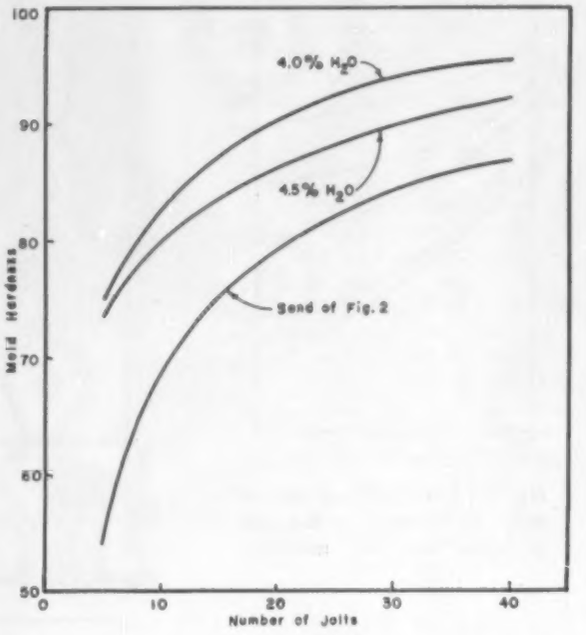


Fig. 4 (right) . . Test is sensitive to different sands and to varying moistures.

will have higher average density than the 6 in. column.

The lower mold hardness at the base of the 6 in. column when compared with the 12 in. column results from the reduced weight of sand in the former. Lower weight produces lower power input to the sand from jolting.

Correlation of green sand properties at the jolt or parting surface may be partially accomplished through the mold hardness value and standard 2 inch AFS sand specimen. These specimens are tested in the usual way for permeability, mold hardness and green compression strengths, however they are prepared on a sand rammer with a 2 lb rammer weight, rather than the standard 14 lb weight.*

The 2 lb weight is necessary to obtain sand densities and mold hardness of the same magnitude as those imparted by a jolt machine. The relation of number of rams to mold hardness and green strength of the sand described in the table and Fig. 2 is presented in Fig. 3.

The top of the 2 in. specimen receives the ramming impact, so that it is similar to a jolted surface. Using Fig. 2 and 3, a mold hardness of 80 at the top of the specimen and the bottom of a 12 in. sand column is accompanied by about 6.5 psi green compression strength. The figure is not exactly accurate, since in each case there is a density gradient in the sand. However, it is a far more representative value than would be obtained with the standard sand testing combination of 14 lb weight, 3 rams and 2 in. drop; in this case 12.0 psi and 90-92 mold hardness.

If the jolt test is to be useful, it should be capable of revealing any differences which may exist in response of a number of sands to jolt molding. For comparison with Fig. 2, the effect of jolting on mold hardness of a second sand at two moisture levels is shown in Fig. 4.

This bi-level test showed mold hardness higher at a lower moisture content. Mold hardness of the second sand is substantially higher than the first sand at any given number of jolts although the same molding machine was used in each case. After 20 jolts, the first sand has 79 mold hardness and the second 86 to 91 mold hardness. The difference between the two might be described as due to a change in "flowability." More accurately, the second sand has superior response to jolt molding; *i.e.* jolt compactability.

To study jolt compactability more specifically, the jolt tube may be fitted with one flat side for determining penetration of mold hardness up from the parting surface.

This is done by inserting a strip of metal with a 7/8 in. wide flat side and the other side contoured to fit the tube. The strip is held in the tube with a screw.

After jolting as before, the specimen is stripped from the tube by first pulling out the metal strip and then pushing it out on a stripping post. Mold hardness readings are then taken at 1 inch increments from the jolted surface (Fig. 5). Data are then plotted as a function of distance from the jolted surface as shown in Fig. 6.

Figure 6 shows how moisture content of a sand affects the penetration of hardness up the vertical side wall from the jolted surface. When performed in this manner, the jolt test is truly capable of measuring flowability of molding

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* *"Does Sand Testing Give Us The Facts?"*, Heine, King and Schumacher. MODERN CASTINGS, pp 30–33, January, 1956.

Fig. 5 . . Taking mold hardness.

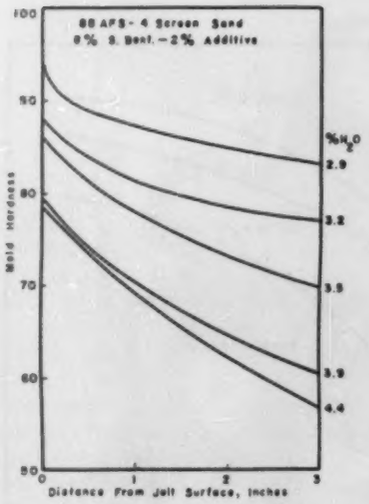


Fig. 6 . . Moisture has marked effect on hardness up flat side of jolted sand test specimen.

sand under jolt molding.

The jolt test is also an excellent means of measuring the jolting efficiency of different molding machines. Furthermore, the effect of the jolt table load on jolting efficiency can also be measured. When jolt effectiveness is being studied, a single sand of known density and predetermined sand column height should be used throughout the tests.

The hardness and density of sand that jolting develops is dependent on the effectiveness of the jolt because the jolt stroke is a mechanical characteristic of the machine. Length of jolt stroke and weight of sand determine the power applied from momentum of the sand at the instant of impact. Sand weight per unit area of projected parting surface depends on sand density and sand (flask) height.

The relationship of jolting power to jolt stroke and sand weight is shown in Fig. 7. From this figure, it is evident that different mold hardness and density will be obtained from any given sand and column height, depending on the jolt stroke. Included in Fig. 7 is the ramming power of a 2.0 lb ram weight dropped 2.0 in. on a 2.0 in. x 2.0 in. diameter sand specimen. Power supplied by the 2.0 lb ram weight is of similar magnitude as the molding machine with 3.0 in jolt stroke.

The effect of jolt stroke on mold hardness is shown in Fig. 8. The sand referred to in Fig. 5 was also used for the tests reported in Fig. 8. Curves *A* and *B* show data obtained on two different molding machines of 4.5 and 3.0 in. jolt stroke respectively. Curves *B* and *C* were obtained from the same machine at jolt strokes of 3.0 and 1.5 in. respectively. In the latter case, the jolt stroke was reduced from 3.0 to 1.5 in. by putting 200 lb additional weight on the jolt table to simulate a large flask and heavy sand and pattern load.

The effect of table load on jolt stroke of three different molding machines is shown in Fig. 9. It is quite evident from Fig. 8 and 9 that it is inherent in the machine to produce low mold hardness (and density) when the table is overloaded. The sand should not be blamed for a condition peculiar to the molding equipment.

Because overloading the molding machine by using too large a flask will obviously lead to inferior molding practices, particular attention should be paid to the effects of overloading. Note that the length of jolt stroke is shortened by increasing the weight on the jolt table (the sum of the weight of flask, pattern and sand in the flask.) This should be taken into consideration in the purchase of a molding machine, because it is the length of the jolt stroke and the solid impact that governs the ram of the sand ramming in the flask.

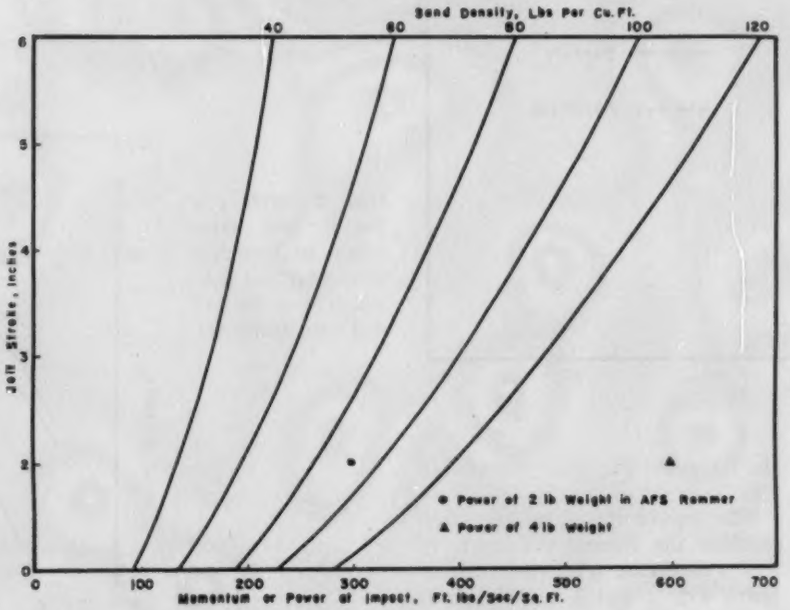


Fig. 7 . . Sand density increases with impact (jolt stroke, sand weight).

Fig. 8 . . Jolt stroke alone causes significant differences in hardness.

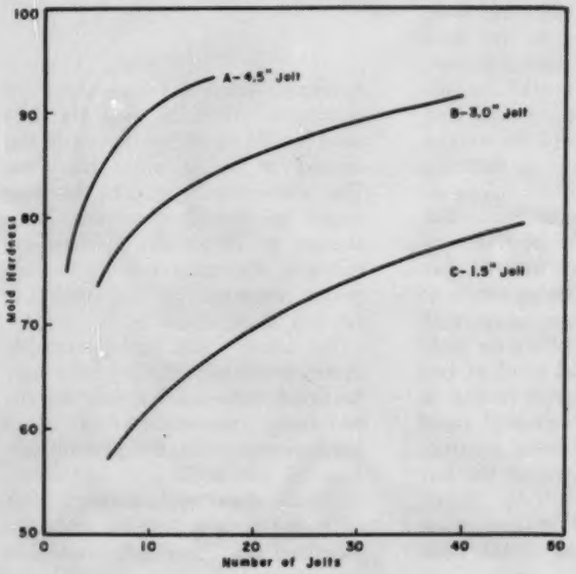
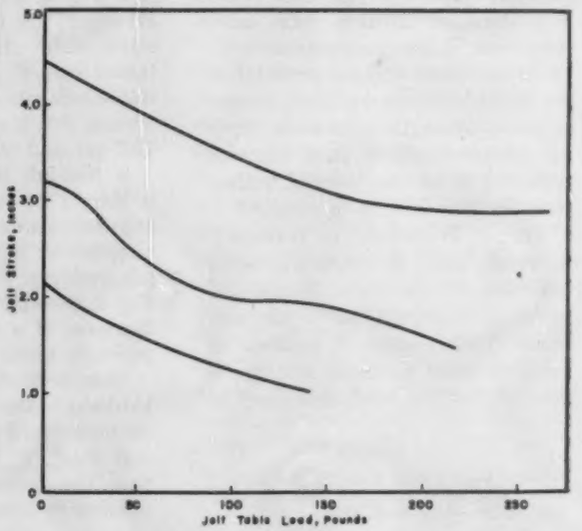


Fig. 9 (below) . . Don't blame the sand when its the equipment. Here's what happens to the jolt stroke when table load (pattern, flask, sand) is increased. See Fig. 8 for effect on mold hardness.



This paper will be presented at a Sand session of the 1956 AFS Castings Congress & Show in Atlantic City, May 3-9. Written discussion should be sent to the American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.

Metal craftsmen of the Bronze era are casting tools and weapons in permanent stone molds.

H. F. Dietrich / *Head*
Foundry Dept.
Kansas State College

MEN, MAGIC and METALS

Metalworking was once considered black magic and practiced in secret because heat was associated with evil

"The period between 8000 and 3000 B.C. . . . A native banked his fire one night with copper-bearing ore and in the morning noticed some gleaming beads in the ashes. This must have happened hundreds of thousands of times . . . A forge fire, operating under perfect conditions and reducing the copper ore to be hammered into tools, produced a castable molten product. . . . A whole new world opened for the metal fabricator".—Bruce L. Simpson in Development of the Metal Castings Industry.

■ **The dawn of metalworking** is steeped in superstition and lost in antiquity. Man had his hands full with the problems of existing from day to day in a world where the slightest relaxation could be fatal. Until 4000 B.C. he resisted the widespread use of metals. But even after his acceptance of metal as a tool to make life more interesting, superstition and lack of understanding placed obstacles in his path. The art probably was lost and found many times because of the secrecy of the metalworkers.

The first metals worked by man were those found free in nature. Refined in the internal crucible of the earth, held at temperatures that allowed grain growth, bathed in gases that promoted refining, these metals were deposited as workable alloys. In time, natural erosion exposed the deposits to be found by man. Imagine the surprise of the first caveman who sat idly beating on a strange colored stone to find that, instead of chipping into smaller pieces, the stone elongated under his cold-working effort. Native metals found by man in the free state were silver and gold. Until his campfires accidentally smelted the metal-rich rocks, he was unable to use copper, nickel, and other easily reduced ores.

Meteoric iron added to the fund of metal available to early man and provided him with a material which he was unable to extract, with his limited knowledge, from earthly ores. The iron alloy which came to him from the sky was carbon-free and contained manganese, cobalt, and five to fifteen per cent nickel as alloying elements. This heaven sent metal is found in many of the relics left in the garbage dumps of ancient man.

To lighten his work, man banked his fires with mud to preserve them through the night. By a fortuitous choice of materials with which to make the mud walls of his fire bank, he used some rich ores for the purpose. An unusually high wind might have caused the fire to burn at a higher rate, thereby creating sufficient heat to melt the sidewalls of his crude furnace and extract the metal from the ore. The resulting button of metal no doubt established the first ironmaster in his trade. He had learned how to get a small amount of metal.

By matching the color and texture of earth, and by continuous trial and error, he was able to perpetuate this new found skill. The campfire furnace was improved in design by building the fire beside a cliff where draft conditions were improved.

The first metal extracted from the ore fed into this crude furnace was copper. Although it was contaminated with cuprous oxide by the uncontrolled melting conditions. our bettle-browed blacksmith managed to use it for tools and ornaments. As early as 3350 B.C. copper pipe was used in Egypt. The 25 percent cuprous oxide inclusions caused embrittlement and were the result of melting without flux.

The discovery of bronze was accidental. The early metalsmith found copper and tin ores deposited together. When melted, they produced an alloy that contained less cuprous oxide, therefore was less brittle. By matching the texture and color of the earth, the metalsmith was able to control the addi-

tions which produced the best product for his use.

The so-called bronze age began about 2500 B.C., probably in the middle east. But no clear cut line in time can be drawn between the use of bronze and the other metals. Iron was in use before the bronze age in Africa, Iran, Egypt and China, but the relics we find indicate that it was meteoric in origin. In America, the Indians did not advance beyond the use of native copper, silver, and gold until the white man brought iron.

Because more heat than was available to man in 2500 B.C. was required to develop iron to its full potential, the widespread use of iron had to wait until man developed better fuels and better ways of burning them. With the discovery of the heating qualities of charcoal, the use of iron enjoyed a greater popularity. Bronze was replaced by the stronger wrought iron which could be produced by comparatively low heat from bog ores.

Natives in the regions where bog ores were available would gather the sticky mass, shape it into balls, and allow the balls to dry. By heating with charcoal and forced draft supplied by human power, a small bloom could be formed. The bloom was beaten to remove slag and to produce the desired shape.

This process, although it smelted the ore, did not melt the iron. Carbon from the charcoal combined with the oxygen in the ore and left a spongy mass of carbon-free iron and slag that could be made more compact by hammering. Just as the 19th century smithy used silica sand as a flux for forge welding, so the metalsmith of 2000 B.C. or 3000 B.C. made use of the slag inclusions to weld the plastic mass he produced into a useable implement. Because the laminations of slag inclusions inhibited corrosion of the metal, wrought iron had excellent lasting qualities. Many of our relics are made of wrought iron forged in antiquity.

Even as are our modern discoveries, the first steel bar was the result of accident. Some apprentice, in a hurry to go on a date, probably left buried in the forge the bar he was heating. The fire was allowed to burn itself out, and the bar remained at carburizing temperature long enough to absorb carbon from the charcoal. It is evident from the metalworking processes which followed that this first steel bar became hard beyond usefulness.

Reheating the bar with carbon-free iron and further forging caused the two materials to weld, but the identity of the two metals was still evident. When the iron-master tried to break the bar he found that it did not bend as did the wrought iron, nor did it break as did the high carbon iron. Instead, it had a spring in it. This discovery, the result of trying to correct an error, led to the process of making Damascus blades. Bundles of iron and steel beaten together, and shaped into a blade, gave the Crusaders trouble.

The use of steel as an every day metal is believed to have started in China about 1000 B.C. and worked its way west. By 300 B.C. India had a flourishing business in butcher knives. Toledo probably began to make steel about 600 B.C. By the time the Romans got there in 192 B.C., Toledo was running an internationally advertised business in weapons—the advertising being done by people maimed with the blades.

Progress in metalworking was comparatively rapid for a time. A method of heat treatment was discovered. People with squeamish stomachs prefer to believe that the discovery of the benefits of quenching came about because some armorer was in a hurry to get home after the whistle blew. This version of the story claims that the armorer dropped the blade into a horse watering tank to cool it rapidly—discovering the quenching process.

But in 1865 A.D. was discovered the ruined workshop of an armorer of Tyre.* A preserved parchment found in the ruins gives detailed directions for heat treating a Damascus blade. The document exposes man's inhumanity to man.

"Then let the master-workmen . . . thrust it into the fire of cedarwood coals, in and out, while reciting the prayer to the God Balhal, until the steel be the color of the red of the rising sun . . . and then with a quick motion pass the same from the heel thereof to the point, six times through the most fleshy portion of the slave's back and thighs, when it shall have become the color of the purple of the king . . ."

This version is the only logical inference that can be drawn from the wording of the document. It seems that some vile tempered armorer spent a hot, humid afternoon in Tyre beating a bundle of steel and iron to shape.

About the time the blade was drawn from the forge for visual inspection, who should drop in but a heckling friend who made some disparaging remarks about our hero's work. To take this kibitzing was a little beyond the call of duty and our begrimed master-workman promptly corrected the flaw in his friend's manners by using the hot blade for a barbecue spit, impaling him where it did the most good—for the blade, that is. As long as he had started the job, he proceeded to finish it by trying the blade in different parts of the friend's anatomy. When the blade was inspected it displayed qualities never before found by the master-workman in a blade of his making—and a new skill was born.

The parchment reads, "Let the high dignitary furnish an Ethiop of fair frame and let him be bound, shoulders upward, upon the block of the God Bal-hal, his arms fastened underneath with thongs . . ."

The above excerpt reveals that our hero was a careful man. By calling upon the high dignitary to supply and bind the man in the name of religious ritual, any question the Ethiop might have raised was purely academic.

Further perusal reveals that the heat-and-beat artist believed in quality testing of his work.

"Then, if with one swing and a stroke of the right arm of the master-workman it severs the head of the slave from his body, and display not nick or crack along the edge, and the blade may be bent round about the body of the man and break not, it shall be accepted as a perfect weapon, sacred to the service of the God Bal-hal . . ." And thus impact tests and elastic limit tests were written into the book of time.

From the campfire pit, to charcoal, to forced draft, to the shaft furnace in 1323 A.D.—the first with sufficient heat to melt iron—man has found new sources of heat energy. In each step the heat produced was a little higher, opening new fields of metallurgy.

In 1619 A.D. Dud Dudley tried bituminous coal as a heat source. With his new fuel, Dudley produced 10 tons of iron per day, an exceptional increase in production.

In 1784 A.D. coke and flux were first used in the colonial blast furnaces. Furnace design had not changed materially since the invention of the shaft furnace. Mechanization had not yet been introduced to the industry. The usual method of charging was to build a ramp from a hillside to the top of the stack where the ore, coke, and limestone, or shells of clams and oysters, were introduced into the top of the open stack.

Open trenches into which the iron was tapped gave pig iron its name. A center trough cut into the floor led into smaller troughs to each side where the molten metal solidified. To men raised on farms, the result of such casting looked like a sow suckling pigs. They called the center runner a "sow" and the small castings "pigs". Modern blast furnaces produce the pigs without using a sow, a trick the agriculturist would like to duplicate.

In the 1850's A.D. Kelly and Bessemer, working independently, perfected the steel converter virtually in the form used today. With the high production made possible by this new method of making steel, the huge steel industry was given birth to supply the increasing needs of a growing population.

Now, a new source of energy has been found. With the high heat of nuclear fission, modern man has realized the dream of the ancient alchemists. He has unlocked the atom and transmuted metals. Perhaps in the next century the use of atomic energy, changed melting practice, the use of vacuums and pressure, regulated alloying, and discoveries yet unknown, will relegate our present day methods to take their place beside the campfire pit and the cliff furnace.

Where does the dawn stop and the morning begin? Each time man found some new source of heat, metalworking advanced. Are we still in the dawn of metalworking?

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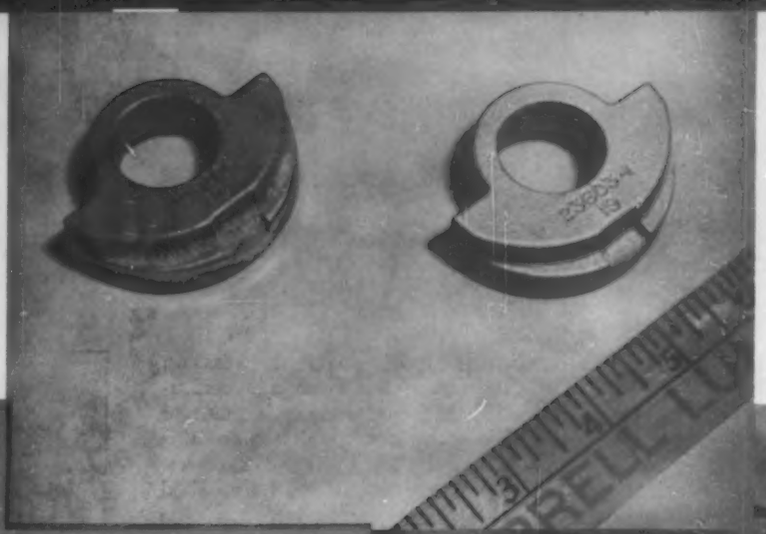
*"Hardening a Damascus Blade," *Journal of the Iron and Steel Institute*, v 47, Nov. 1, 1895 pp 452-453.



Gray Iron counterweight castings (left) and motor ratchet castings (far left) before and after cleaning.

SHELL MOLD CASTINGS NEED CLEANING TOO

A few variations in blasting are recommended

EUGENE F. ANDERSON
Special Engineer
Wheelabrator Corp., Mishawaka, Ind.

Gears ready for automatic unloading after 3-min blasting.

■ Shell molding's switch from a laboratory technique to a volume production method presents the need for a re-examination of the cleaning and finishing of shell molded castings.

Originally, it was claimed that due to the excellent surface finish obtained in the process, no subsequent cleaning would be required. Although it is true that most shell molded castings have better finishes than many green sand castings, there are few plants using the shell process that have been able to abandon the cleaning operation.

First, the shells leave residual sand on the castings, and there is also an oxide or scale formed on the casting. On brass, even though the castings come from the molds sandless, they are discolored by scale. Increased sales appeal resulting from the removal of scale and grinding lines is another factor that caused the introduction of the cleaning operation in the production of shell molded castings.

Volume production means volume cleaning. Since abrasive blast cleaning was one of the conventional methods for sand castings, it was tried on shell moldings and, the results were successful. A few variations in blast cleaning techniques from those of sand castings cleaning were made. For instance, smaller abrasive sizes are generally used to retain the good surface quality of the shell molded casting.

Midwest Foundry Co., a division of L. A. Darling Co., Coldwater, Mich., has a shell molding department pouring up to 3½ tons of gray iron and steel daily, or about 225,000 cast pieces per month. Procedure here, after pouring and shakeout, is to grind off the gate and flash on the parting line, heat treat (if required), clean the parts by airless blasting, and then machine.

All cleaning of these parts is done in two to three hours a day. An airless blast cleaner with a five-cubic-foot blast chamber is used, permitting the following rates on some production parts that are not heat treated: counterweight pieces sized 2⅛ in. x 2 in. x 1 in., 1200 per batch, cleaning time—5 minutes. A motor ratchet casting 1-3/4 in. OD x 1-3/4 in. long is blasted in groups of 1500, with a blast time of 5 minutes. A connecting rod 3¼ in. x 1-7/8 in. x 3/4 in. is heat treated in production. 1500 of these are cleaned at once, but due to the heat treat scale, the time ranges up to 20 or 30 minutes.

Blasting is done by hurling metallic abrasive at the castings enclosed in the blast chamber. The abrasive is hurled centrifugally by a rotating bladed wheel in the roof of the chamber. No compressed air is employed.

Blast coverage on all surfaces of all the parts is accomplished by combining a tumbling action with the blast. Tumbling action is provided by endless belt conveyor in the blast compartment. The belt travels continuously through the chamber in a path that forms the letter *J*. At the bottom of the *J*, the belt forms a trough for holding the parts. The continuous motion of the belt draws parts up from the bottom of the load and places them on top where the abrasive blast can strike them.

After being blasted, the abrasive is collected, automatically cleaned of the contaminants removed from the castings, and refed to the hurling wheel for reuse.

You CAN Cast MAGNESIUM in PLASTER

You can produce thin sections, close tolerances, and special surface conditions on castings under 1 oz to over 100 lb

E. J. Willis / *Development Division*
Aluminum Co. of America, Cleveland

■ **The use of plaster molds** in a modern magnesium foundry, while relatively new, is finding applications where normal sand castings never quite hope to compete. Plaster molds are produced by a water mixture of gypsum strengtheners and setting agents. The molten metal is poured into this plaster cavity. In the work so far at our magnesium foundry at Buffalo, N. Y., better tolerances and smoother surface are prevalent, as well as reduced cost of the final part by eliminating machining.

The usefulness of this process needs to be understood both by foundrymen and designers so that castings made by it will provide the necessary surface and critical dimensions without penalizing the cost more than necessary.

■ **Size and range of parts.** Because of the variety of parts cast, we are able to indicate at present that the size of castings which can be made in magnesium range from less than one ounce to over 100 lb. We do not feel that this range is limited in any way. No difficulties have been encountered.

Castings which are as small as 1 in. in maximum dimension to over 3 ft have been cast successfully. Here again, the limitations are only from background and not from the use of plaster.

■ **Surface roughness.** The use of plaster in making magnesium castings is producing exceptionally smooth surfaces compared with sand-cast parts. The surface finish obtained on magnesium sand castings will vary considerably from piece to piece, but in general the surface will be between 400 and 1000 micro-inches unless special finishing techniques are employed. When plaster is used as the mold material, surface finishes in the neighborhood of 100 micro-inches are quite common.

At present finishes which range as low as 50 or 60 micro-inches can be found in some areas on the casting but from a specification standpoint we are hesitant to accept castings which require this smooth a finish on all surfaces. Where agreement can be reached between the casting user and the foundry, special care can be exercised to obtain exceptionally smooth surfaces in specific and limited areas.

■ **Castable magnesium alloys.** Our production of magnesium castings in plaster has indicated that all normal magnesium alloys which may be sand-cast can be cast fully as well in plaster molds. In addition to these standard alloys we feel that the usefulness of the process may extend itself to both magnesium rare-earth zirconium and the magnesium-thorium-zirconium alloys if the demand for high-temperature castings to close tolerance and smooth finishes continues. Many jet-engine and guided-missile applications may soon require these alloys for proper functioning of the machines. This will be a natural out-growth of the room-temperature applications already in production.

■ **Dimensional tolerances.** Figure 1 shows two typical sections through castings produced in plaster. This shows the necessary parting lines, draft, and thickness relations. Dimensions *A* is taken across the parting line. A tolerance at this point of plus or minus 0.010 in. for the first inch or less and an additional 0.001 in. for each additional inch of length should be added.

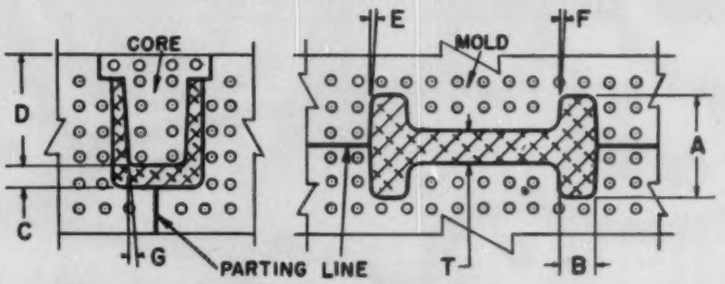
Item *B*: Between points produced by any one part of the mold, a tolerance of plus or minus 0.005 in. for the first inch or less and an additional 0.001 in. should be added to this tolerance for each additional inch of length.

Item *C*: Between points produced by a core in the mold, tolerances of plus or minus 0.010 in. for one inch or less, plus an additional 0.001 in. / extra inch.

Item *D*: The maximum length of core supported at one end is normally five times the diameter of the core, where if the core is supported at both ends the lengths of a small-diameter core may be as much as ten times the diameter.

Items *E*, *F*, and *G*: At many points in castings using plaster cores and plaster molds zero draft is permissible. This is especially true in local areas; however, as a general rule 2° is desirable. As far as general rules are concerned the minimum diameter of separate cores which we would like to see used is approximately 1/4 in. The minimum thickness shown as a T-dimension should be considered as about 1/8 in. over any 6 in. linear dimension. In local areas where an area does not exceed about 30 sq in. or three to six linear inches,

PLASTER MOLD TOLERANCE



A . . Across parting line: ±0.010 in. for 1 in. or less; add 0.001 in. to tolerance for each additional inch.

B . . Between points produced in one part of the mold: ±0.005 in. for 1 in. or less; add 0.001 in. to tolerance for each additional inch.

C . . Between points produced by core and mold: ±0.010 in. for 1 in. or less; add 0.001 in. per each additional inch.

D . . Maximum length of core support at one end; 5 times core diameter.

E, F, G . . Draft: 0° in many cases; 2° is desirable.

Notes:

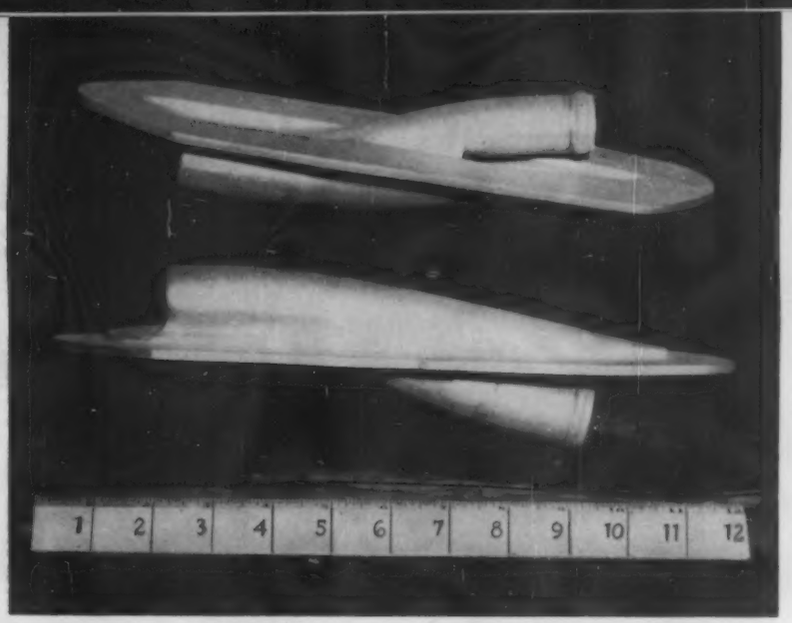
1 . . Minimum diameter of separate cores: ¼ in.

2 . . Minimum thickness "T" for distance of:
less than 3 in. . . ⅛ in.
3 in. to 6 in. . . 3/16 in.
over 6 in. . . ¼ in.

3 . . An area of the casting with dimensional advantage from plaster section should be used for locating in set up for machining.

4 . . Minimum radius of fillet; sharp corners can be cast when desired.

5 . . Nominal surface finish: 125 microinches rms or better.



Sand-cast magnesium alloys, cast fully as well in plaster molds.

Plaster with sand and permanent molds brings out detailed lettering.

thicknesses as low as 3/32 in. can be tolerated.

There have been some castings where very small local areas need to be very thin but are fed easily by surrounding thicker sections, and 1/16 in. thickness can be produced. When plaster is used in conjunction with the sand-cast process to obtain local dimensional advantage, these particular areas of the casting produced by the plaster should be used for set-up purposes in machining. Both internal radii and external radii can be reduced considerably over sand-cast magnesium. Sharp corners can be cast with the plaster process when required.

There are many places where detail lettering on a casting is advantageous. Local smoothness for air flow or oil flow is a requirement; engraved markings can be produced locally on plaster castings; close-dimensional tolerance between various points in a casting can be accurately held reducing machining or amount of hand work in finishing.

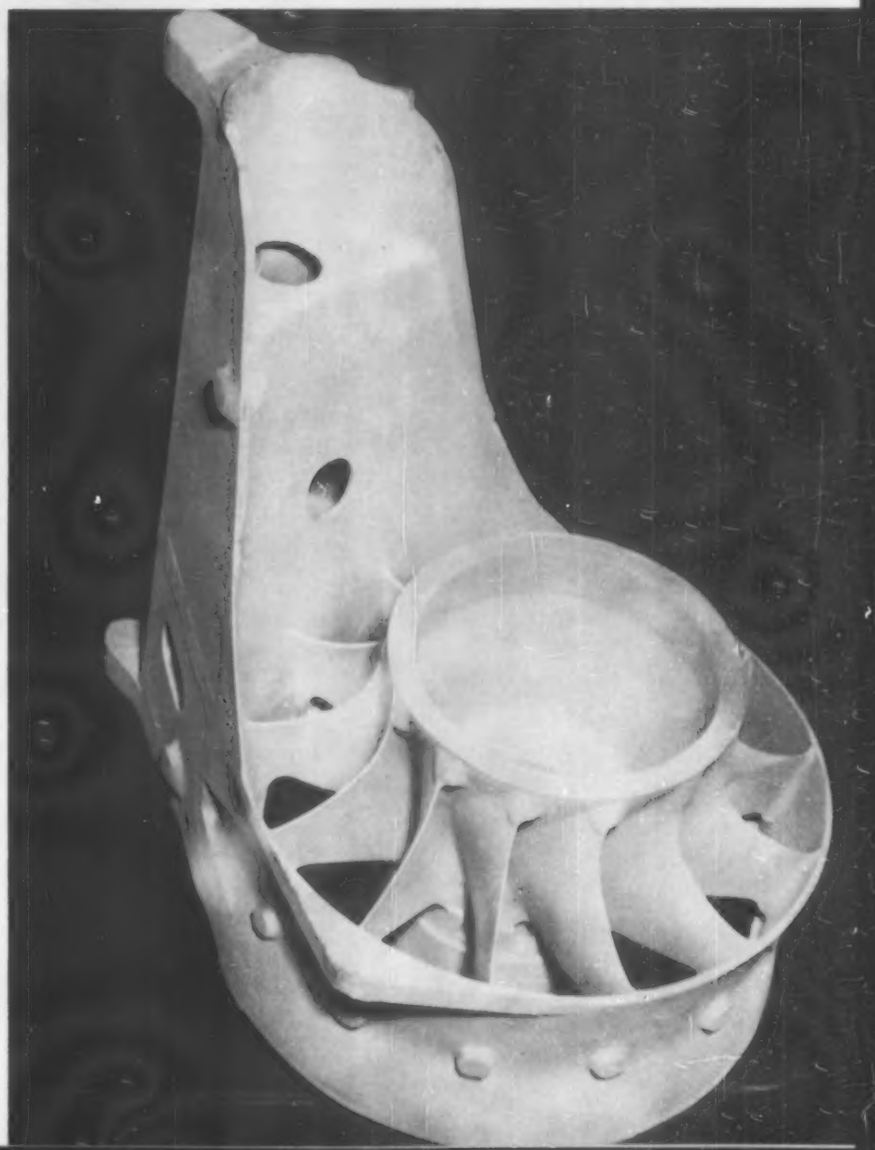
Much thinner sections can be produced when using plaster cores in combination with other mold materials such as sand or permanent molds. The mechanical properties of composite plaster and sand castings will be better than plaster alone can produce.

▪ **Mechanical properties.** Much of our work so far has been with castings having relatively thin sections sometimes with special dimensional tolerances and special surface conditions. For this reason, the mechanical properties surveyed so far are relatively limited. Using AZ916-T6 as the alloy for comparison, our results indicate that we can produce the same yield strength as sand-cast AZ916-T6 (19,000 psi) while the tensile strength and elongation are slightly less in plaster.

These results are based on a test-bar diameter of 1/2 in. In thinner sections this difference will decrease considerably while in thicker sections we expect that there will be few cases where both sides of the section will be produced in plaster. The additional chilling effect of the sand will reduce these differences.

▪ **Future.** This paper should be considered as a progress report of work done to date. We feel that there are many uses for magnesium plaster castings which only await proper publicity before industry demands them where savings are apparent. We foresee a gradual increase in size of castings so produced as well as possible use in fields where normal sand castings are not usually considered. As our foundries become more familiar with the plaster process better tolerances can be obtained as well as better surface-finish control.

This paper was presented at the 11th Annual Convention of the Magnesium Association.



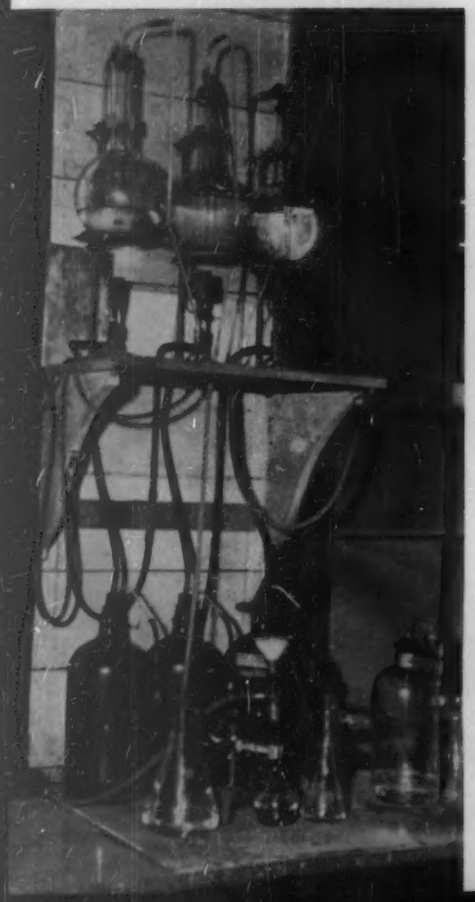
Transferring aliquot of master solution to start analysis for molybdenum.

W. T. UNFRIED, *Chief Chemist*
Texas Electric Steel Casting Co.
Houston, Texas

No log jam of work in your lab when using these methods and solutions that will produce . . .

A Complete Chemical Analysis in 45 Minutes

Filter and wash assembly.



■ Cost control programs might seem foreign to the peace and quiet of the laboratory, but a time and labor saving program for any ferrous foundry chemistry lab has been developed. This program takes the form of time saving chemical analyses for cast and malleable iron, and for all steels except those very high in tungsten.

These rapid analyses permit one chemist to complete a carbon steel analysis in about 45 minutes and a stainless steel analysis in about 90 minutes.

Full use is made of automatic burettes. Where 17.5 ml volumes are specified an automatic milk testing pipette is used. Accuracy when using this equipment is not extreme, but it is more than sufficient for the purpose.

Manganese solutions are not dispensed with the automatic burettes because of the nature of the solutions. The burettes used in the volumetric analysis are those normally used for titrations. The automatic pipettes used for the butyl acetate in the Mo analysis and for the ferrous ammonium sulfate in the Cr analysis must be very accurate.

Methods for carbon and sulphur are not described since procedures will vary with equipment already in use at individual laboratories. When combustion methods are used the analyses of these two elements can be obtained while the other samples are going into solution.

The analysis for iron will require a little longer than a comparable steel analysis because of the graphite and high silicon content.

Precautions

All precautions involving the use of perchloric acid should be followed. Anyone not familiar with its applications should read the discussion on perchloric acid in the 1950 edition of *A.S.T.M. Methods of Chemical Analysis of Metals.* The two main precautions to be observed in these analyses are: always use nitric acid with the perchloric, and have a hood completely lined with an inorganic substance with as simple an exhaust system as possible. A hood and flue that can be washed down daily with water is ideal. If a wash down hood is not used the flue and baffles should be brushed out regularly.

Basic Treatment

Steel, less than 2% Chromium. Weigh a 2.5 gram sample into a 250 ml Erlenmeyer flask, add 35 ml perchloric acid (70%) and 15-20 drops dilute nitric acid (1-2). Heat on hot plate until in solution. Increase heat so that fumes clear up into neck of flask. Temperature must be closely watched as too low a temperature will allow contents to become solid and cause low silicon results. Too high a temperature will cause excessive loss of acid through evaporation. There should be just enough heat to keep the fumes up in the neck.

Boil at this temperature for about 5 minutes, remove from hot

Spectrophotometer shows quantities of eight elements in these analyses.

plate, allow to stand for about a minute, then cool rapidly in running water. Add 75 ml water and swirl lightly until all salts are in solution.

Steel, over 2% Chromium. Weigh 1.0 gram sample into 250 ml Erlenmeyer flask. Take into solution on hot plate with 15 ml water, 10 ml hydrochloric acid, and 10 ml nitric acid. When in solution carefully add 20 ml perchloric acid (70%) if Cr is under 7%, or 25 ml perchloric acid if Cr is over 7%. Boil until Cr is oxidized to orange or deep orange-red and solution fumes freely.

Remove from hot plate using strong tongs, swirl lightly and cautiously add HCl a little at a time down side of flask. Chromium will be expelled as brown fumes ($CrOCl_2$) and solution will lose its orange-red color. Place back on hot plate until solution again turns orange and fumes strongly. Remove from hot plate and add HCl as before. Only a part of the chromium will be volatilized at a time and the solution must be boiled after each HCl addition to re-oxidize remaining Cr. Adding HCl to an un-oxidized solution is of no value. When there are no more brown fumes upon addition of the HCl the volatilization is complete. The solution must then be fumed strongly for a few minutes to boil off all traces of HCl. Cool, add 35 ml water and swirl lightly to dissolve all salts.

Iron, less than 2% Chromium. If chromium is to be determined, weigh a 2.5 gram sample into a 300 ml Erlenmeyer flask. Add 35 ml dilute nitric acid (1-2). When violent action ceases, place on hot plate until iron is in solution. If solution is difficult, add a few milliliters HCl, then add a corresponding amount of 1-2 nitric after solution is complete. Boil a few minutes. Cool somewhat and cautiously add 35 ml perchloric acid. Boil until dense white fumes appear only in the neck of the flask. Continue to boil for about 5 minutes. Cool in air a minute, then in running water. Add 75 ml water and swirl until salts are in solution.

If chromium is not to be determined and the silicon content is high, it is well to use only a one gram sample. In this case take into solution with 15 ml 1-2 nitric followed by 15 ml perchloric acid. After fuming and cooling add only 35 ml water.

Iron, over 2% Chromium. Same as Steel, over 2% Chromium.

Master Solution

Filter the solution obtained in any one of the basic treatments through an 11 cm Whatman 41-H filter paper or equivalent. Use suction and support the paper on a platinum cone. If sample size was 2.5 gm, catch filtrate in a 250 ml glass stoppered volumetric flask. If a 1.0 gm sample, use a 100 ml volumetric flask. If a ring of silica adheres to inside of Erlenmeyer flask, scrape it loose with a rubber policeman and rinse into filter funnel. Wash filter paper and precipitate several times with hot water being careful not to let the filtrate and washings go over the calibration mark on the flask.

Remove volumetric flask, cool, by inverting several times. Reserve for remainder of analyses.

Note: solutions for use in the following analyses are in Foundry Facts page 91.

Silicon

Procedure: After the master solution has been removed from under the funnel, wash silica and filter paper several times with hot hydrochloric acid wash solution until there are no yellow stains on the paper. Wash 8-10 times with hot water to remove all chlorides.

In routine work when tungsten and columbium are absent, ignite the silica and filter paper in a clay annealing cup in a muffle furnace at 1300°-1500°F for 30 minutes or until all carbon is destroyed. Remove from furnace, cool and empty silica onto balance pan and weigh.

If tungsten or columbium are present, ignite original filter paper and silica in a platinum crucible, then weigh. Volatilize silica by adding 2 drops H_2SO_4 and 2-3 ml HF. Heat on hot plate until dry, then ignite at 1500°F. Cool and weigh The loss in weight is SiO_2. If much W or Cb are present, the volatization should be repeated a second time.

$$\% \text{ S} = \frac{(\text{wt. } SiO_2)\ (46.9)}{\text{wt. Sample}}$$

Phosphorous

Procedure: Transfer 10 ml of master solution to a 100 ml pyrex glass stoppered volumetric flask. Add 17.5 ml dilute perchloric acid followed by 17.5 ml sodium sulfite solution. Heat until solution clears then carefully add freshly prepared mixture of 20 ml water, 7.5 ml ammonium molybdate solution and 3.0 ml hydrazine sulfate solution. (This mixture should be used within 5 minutes after mixing.)

Place flask on steam bath or in hot water bath and keep temperature at 95°-98°C for 12-15 minutes. Place on hot plate and allow to come to boil for only an instant. Cool rapidly in running water, dilute to mark, and mix well by inverting several times. Blue color developed is stable for at least eight hours. Read optical density at 650 mu using water as reference.

Calculation: The color obtained in this determination is very stable, yet it almost always has a small blank value. While this blank is constant for the same solutions, it frequently changes when a new solution of ammonium molybdate or hydrazine sulfate is used. Running a blank on the solutions and using as a reference is not as satisfactory as running two standard samples with different phosphorous contents. Readings should be made on the optical density scale rather than on the % transmittance scale. A simple calculation then allows obtaining the % P while any blank value is automatically compensated for.

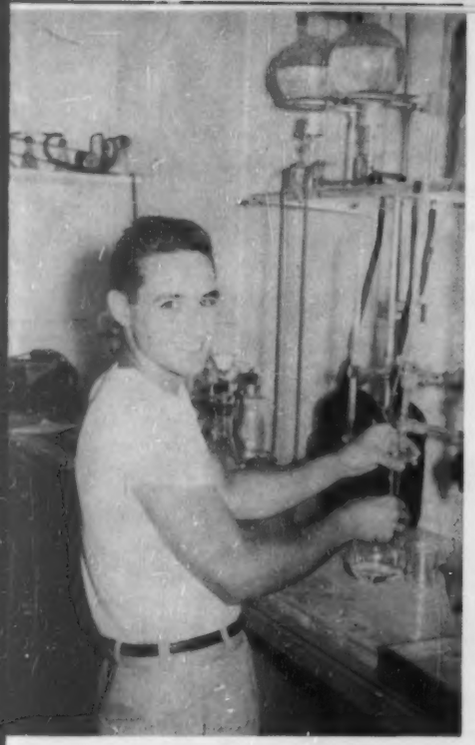
$$\% \text{ P} = \frac{DK + S_1}{V}$$

S_1 = % P in low standard
S_2 = % P in high standard
$K = S_2 - S_1$
D = optical density of sample − optical density of S_1
V = optical density of S_2 − optical density of S_1

If the same two standards are always used, K and S_1 will have constant values which can be inserted in the formula. V will be calculated only once daily. This leaves only % P and D to be calculated for each sample.

Manganese

Procedure: Transfer 40 ml of master solution to a 250 ml Erlenmeyer flask. Heat to boiling and add 20 ml of the acid mixture. Let boil for about a minute then add 50 ml water followed by 20 ml ammonium persulfate solution. Wait for solution to turn red and just begin to boil but **do not boil.** Remove from hot plate and allow to cool slowly for 5-10 minutes or until there is no further evolution



Titration of standard sample.

of gas, then cool below 30°C in running water.

Titrate rapidly with sodium arsenite solution to an orange color, then continue dropwise to a clear yellow end point that does not change with further addition of the arsenite.

Calculation: Carry a standard sample with approximately the same manganese content as the unknown sample through this same procedure.

$$\frac{\text{Titration of std.}}{\text{\% Mn in std.}} = \frac{\text{titration of sample}}{\text{\% Mn in sample}}$$

Chromium

Procedure: Less than 2% Chromium. Transfer 100 ml of master solution to a 500 ml Soxhlet flask. Dilute to about 200 ml with water and add 17.5 ml of the sulfuric-phosphoric acid mixture. Cool if necessary before titrating.

Titrate with standard ferrous ammonium sulfate by adding 10 ml increments from an automatic pipette until orange color is discharged. Back titrate with standard potassium permanganate to faint pink end-point. If vanadium is present pink color will continue to fade slowly toward end of titration. End point is not reached until color persists for at least one minute. If the back titration is less than 2.0 ml add another 10 ml of ferrous ammonium sulfate and back titrate again. Reserve this solution for vanadium determination.

Procedure: More than 2.0% Chromium. Weigh a 100 mg to a 500 mg sample (depending on chromium content) into a 500 ml Soxhlet flask. Take into solution on hot plate with 15 ml water, 10 ml hydrochloric acid, and 10 ml nitric acid. If the Cr content is high, another 5 ml of HCl may be necessary. If the Ni content is higher than the Cr content, another 5 ml of HNO_3 may be necessary. For high silicon steels and especially for iron add a few drops of HF. When solution is complete add 5 ml nitric acid and boil for 3 or 4 minutes.

Remove from hot plate and allow to cool for a minute then carefully add 30 ml 70% perchloric acid. Boil until chromium is oxidized (solution will turn orange) and dense white fumes clear from the flask and are only up in the neck. Continue to boil for 3 to 5 minutes being careful not to lose too much acid through evaporation. Grasp the flask using strong tongs and swirl in a manner that will allow acid to rinse the walls of the flask. Cool in air for only a minute then cool rapidly in running water until solid. Dilute to about 200 ml with water and add 17.5 ml of sulfuric-phosphoric acid mixture. Continue to cool in water bath. Titrate exactly as with the low chromium samples.

Most steels under 10% chromium can be put directly into solution with perchloric acid, in which case the hydrochloric and nitric acids may be omitted; however, about 1 ml of the dilute nitric acid should be added with the perchloric as a precautionary measure.

Calculation: Determine the $KMnO_4$ equivalent of the ferrous ammonium sulfate. To do this, run 200 ml water into a 500 ml Soxhlet flask and add 17.5 ml of the sulfuric-phosphoric acid mixture. Cool if necessary. Add 10 ml ferrous ammonium sulfate and titrate with $KMnO_4$ to a faint pink endpoint. This volume of permanganate divided by 10 is the $KMnO_4$ equivalent of 1 ml of ferrous ammonium sulfate and for brevity is called the **P.E. (permanganate equivalent)** It will usually be about .90 with these solutions.

$$\% \text{ CR.} = \frac{(\text{ml Sulfate})(\text{P.E.}) - \text{ml Permanganate}}{(\text{Factor})(\text{Wt. Sample})}$$

Run a standard sample to determine the factor.

$$\text{Factor} = \frac{(\text{ml Sulfate})(\text{P.E.}) - \text{ml Permanganate}}{(\text{\% Cr in Std.})(\text{Wt. Std.})}$$

The standard sample should be of the same type as the unknown sample. Factors and equivalents should be determined daily. For each new solution of ferrous ammonium sulfate (when kept at a constant temperature) the factor should remain constant from day to day for each type sample, and there should be very little difference in the factors for different type samples. The P.E. may drop as much as .03 ml per week unless the sulfate solution is kept under an atmosphere of hydrogen. When the P. E. drops 10% of its original value, the sulfate solution should be discarded.

Vanadium

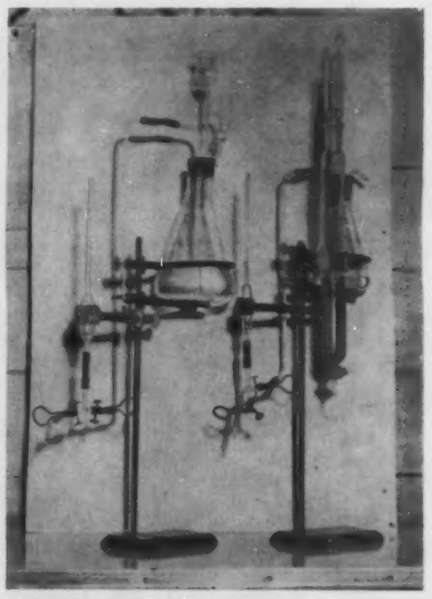
The analysis for vanadium is run from the chromium sample after the chromium has been titrated, provided the Cr was less than 2.0%. If over this amount, the chromium should be volatilized by weighing a 1.0 gm sample into a 500 ml Soxhlet flask and treating exactly as in the basic treatment over 2.0% Cr. After the Cr is volatilized, the solution is diluted to about 200 ml, 17.5 ml sulfuric-phosphoric acid added, and cooled. Ferrous ammonium sulfate is added to reduce the small amount of chromium remaining. Potassium permanganate is then added until a pink color is obtained. Then proceed as below.

Procedure: To the solution remaining from chromium determination, add 3 to 4 ml of the permanganate used for chromium. Agitate contents of flask by swirling for one minute. Add ferrous ammonium sulfate until the pink is discharged and add about 3 ml in excess. Allow to react while agitating the flask for one minute **only.** (Note: These standard solutions for chromium are not used here as standard solutions. They are used merely for convenience; however, the amounts specified should be adhered to as closely as possible.) Add 5 ml fresh 8% ammonium persulfate to oxidize the excess ferrous ion. Swirl or shake for one minute. Titrate the vanadium with N/50 $KMnO_4$ to a pink end point that persists for one minute with constant agitation of the flask.

Calculation: A blank must be run and deducted from the titration. This blank will increase with increasing Cr content, and in routine work where vanadium is determined daily, blanks should be established for different Cr contents. This is accomplished by carrying samples with no vanadium and various amounts of chromium through this procedure. An alternate method is to heat the flask after the titration until the excess permanganate is destroyed. Cool to room temperature and titrate to the same end point. The amount required is the blank.

1 ml N/50 $KMnO_4$ is equivalent to 0.00102 gram V.
1 ml N/50 $KMnO_4$ is equivalent to 0.00134 gram $Na_2C_2O_4$
S eq = Sodium oxalate equivalent of 1 ml $KMnO_4$
V eq = Vanadium equivalent of 1 ml $KMnO_4$

$$\text{V eq} = \frac{\text{S eq } (0.00102)}{0.00134}$$



Ammonium hydroxide pipette and dispensing burette.

$$\%V = \frac{(\text{Titration} - \text{Blank})\,(\text{Veq.})\,(100)}{\text{Wt. Sample}}$$

Nickel

Procedure: Less than 3.0% Ni. Transfer 10 ml of the master solution to a 250 ml glass stoppered volumetric flask. If the nickel is above 1.5% use only 5 ml. Add the following in rapid order, mixing well after each addition.

17.5 ml 20% Tartaric Acid.
10 ml saturated Bromine water
20 ml Ammonium Hydroxide (3-1)
10 ml 1% Dimethylglyoxime.
5 ml saturated Bromine water.

Wait exactly one minute and add 25 ml 25% sodium hydroxide. Dilute to 250 ml and mix well by inverting several times.

Let stand 10-15 minutes in a dark place. If the nickel is very low (about 0.10%) the solution will require about 30 minutes for full color development. This color is stable for at least 12 hours if kept away from light in a glass stoppered flask. Light will not harm the solution over short periods while making readings, but direct sunlight must be avoided. Read percent transmittance in colorimeter or spectrophotometer at 540 mu using water at a reference solution.

Calculation: Less than 3.0% Ni. Prepare a graph from samples with known Ni content from 0-1.50%. If only 5 ml of the master solution are used, double any answer obtained from the graph.

Procedure: 3% to 15% Ni-Colorimetric. If the nickel is 3 to 7%, weigh very accurately a 200 mg sample into a 250 ml volumetric flask. If the nickel is 7 to 15.0% use a 100 mg sample. Take into solution on edge of hot plate with 10 ml water, 10 ml hydrochloric acid, and 10 ml nitric acid. If solution is difficult, add a little more HCl. When solution is complete add 5 ml nitric acid and boil gently 3 to 5 minutes. Remove from hot plate, cool, dilute to 250 ml and mix well.

Allow any precipitate to settle, then transfer 25 ml to a 250 ml volumetric flask and continue as with nickel less than 3.0% with addition of the tartaric acid.

Calculation: 3%-15% Ni. Use the graph for 1-1.50% Ni. for nickels 3%-7% with a 200 mg sample, multiply the percent from the graph by 5 for a tentative percent. If a 100 mg sample was used multiply by 10 for the tentative percent. Do the same for a standard sample with approximately the same Ni content.

$$\frac{\text{Tentative \% Ni in Std.}}{\text{Actual \% Ni in std.}} = \frac{\text{Tentative \% Ni in sample}}{\text{Actual \% Ni in sample}}$$

There should be very little difference between the tentative and actual percents.

Procedure: 15 to 30% Ni-gravimetric. Transfer 10 ml of the original master solution to a 400 ml beaker. Dilute to 200 ml with hot water followed with 17.5 ml 20% tartaric acid. Neutralize with NH_4OH and add 1 ml in excess. Add HCl until slightly acid, warm to 60°-80°C, and add 20 ml 1% dimethylglyoxime. Add NH_4OH until slightly alkaline and digest for 30 minutes at 60°C.

Filter through a weighed Gooch crucible using light suction and being careful not to let the mat run dry. Wash with hot water. Check the filtrate for completeness of precipitation by adding a few ml of dimethylglyoxime and digesting for awhile. Dry the precipitate for one hour at 100°-110°C. and weigh as the salt $NiC_8H_{14}O_4N_4$ which contains 20.32% Ni.

Calculation: 15%-30% Ni.

$$\%\,\text{Ni} = \frac{(\text{Wt. precipitate})\,(20.32)}{\text{Wt. Sample.}}$$

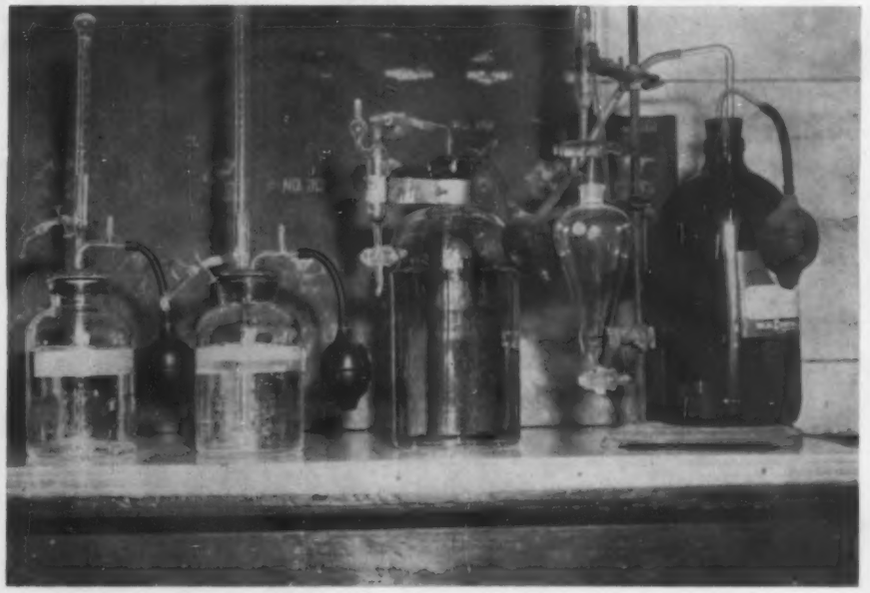
Molybdenum

Procedure: Less than 1.5% Mo. If the molybdenum is less than 0.75 transfer 10 ml of the master solution to a 125 ml Erlenmeyer flask. If content is 0.75 to 1.50% transfer 5 ml of master solution plus 5 ml of another solution of the same type sample, but containing no molybdenum, to a 125 ml Erlenmeyer flask. Add 17.5 ml dilute perchloric acid. Cool if necessary before continuing the analysis. Add 10 ml NaSCN followed by 25 ml $SnCl_2$. Swirl a few seconds and pour into a 250 ml separatory funnel which already contains 25 ml butyl acetate.

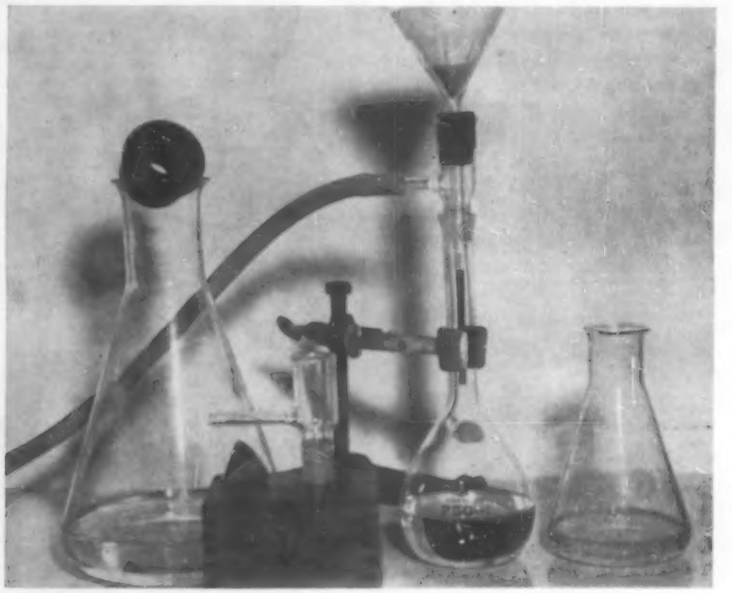
Stopper the funnel and shake vigorously. Allow to settle, drain off bottom layer and discard. If Mo content is expected to be below 0.10% or if the butyl acetate has a pink rather than orange color, add 10 ml more of the stannous chloride. Run some of the butyl acetate layer into a clean dry test tube or cuvette and read transmittance at 530 mu using butyl acetate as a reference.

Calculation: Prepare a graph from 0 to 0.75% Mo using standard samples. If 5 ml of an unknown sample are used, double the percentage obtained from the graph.

Procedure: 1.5%-5% Mo-Colorimetric. For higher molybdenum contents the concentration in the master solution is too high for colorimetric analysis unless a very small aliquot is taken which will decrease the accuracy considerably. To overcome this problem, make a



Burettes and pipettes. Third bottle from left contains a milk testing pipette.



Filter assembly of flasks, support, adapter, and platinum cone.

less concentrated master solution in exactly the same manner as 3 to 15% colorimetric nickel. A comparable high Mo standard should be carried through the same procedure. Twenty-five ml aliquots should be taken from these solutions.

Calculation: 1.5%-5% Mo. Use the graph for the 0-.75% Moly. If a 200 mg sample was used for the master solution, multiply the percent obtained from the graph by 5 for a tentative percent. If a 100 mg sample was used, multiply by 10. Do the same for the standard sample to obtain the tentative percent.

$$\frac{\text{Tentative \% Mo in Std.}}{\text{Actual \% Mo in Std.}} = \frac{\text{Tentative \% Mo in sample}}{\text{Actual \% Mo in sample.}}$$

The tentative % Mo and the actual % Mo should be about the same.

Procedure: 5%-10% Mo-gravimetric.

Transfer 25 ml of the original master solution to a 500 ml beaker. Add ferrous ammonium sulfate solution (for chromium) to reduce the chromium then add about 5 ml more after the orange color has been discharged. Dilute to 100 ml with water and cool to 5°C. Add with constant stirring 10 ml ∝-Benzoinoxime plus 2 ml extra for each 1.0% Mo. present. Add bromine water until yellow then add 5 ml more. Follow with 5 ml ∝-Benzoinoxime and a small amount of ashless paper pulp. Let stand for about 10 minutes with occasional stirring.

Filter through a whatman 41-H filter paper. If the first of the filtrate is not clear, filter again. Wash 10 to 15 times with cold fresh wash solution. If enough ∝-Benzoinoxime has been added, needle-like crystals will form in the filtrate after a time.

Ignite the precipitate and paper in a platinum crucible at 500°C using care not to let the paper burst into flame. Cool, weigh, and re-ignite to constant weight.

Add 5 ml NH_4OH to the precipitate. Digest then filter again. Wash well with dilute NH_4OH (1-99). Ignite in original crucible. The difference in weight is due to the MoO_3 which is 66.7% Mo. Tungsten will not interfere because if present originally, it was filtered from the solution with the silica in the basic treatment.

Calculation: 5%-10% Mo.

$$\% \text{ Mo} = \frac{(\text{Wt. } MoO_3)\ (66.7)}{\text{Wt. sample}}$$

Copper

Procedure: Less than 0.50% Cu. Transfer 5 ml of master solution to a 100 ml volumetric flask. Add 5 ml acetate buffer solution followed by 2 ml gum arabic solution. Dilute to 100 ml. Transfer to 150 ml beaker and add slowly with constant stirring exactly 1 ml rubeanic acid solution. Read transmittance within 20 minutes at 660 mu. Use a mild steel or iron sample as a zero reference. This reference is prepared exactly as the sample and should have a known low copper content, preferably about 0.01%.

Calculation: Less than 0.50% Cu. Prepare a graph from standards with various copper contents. Copper sulfate solution can be added to some of the standards to raise the copper to a desired level. When calculating an unknown sample, the percent copper in the reference solution is added to the percent obtained from the graph. From this deduct 0.002% for each 10% nickel present in the sample.

Bibliography

Miller, Geld, and Quatinetz, "Colorimetric Determination of Copper in Steel", *Analytical Chemistry*, v 22, 1950, p 1572.

Makepeace and Craft, "Nickel in Steel", *Industrial and Engineering Chemistry, Analytical Edition*, v 16, 1944, p 375.

Westin, "Phosphorous Determination", *Steel Foundry Facts*, July 1951, pp. 8-9.

Vanadium Corporation of America, "Determination of Vanadium", Analytical Methods No. IS-IV-I.

Scott, *Standard Methods of Chemical Analysis*, v 2, New York, D. Van Nostrand, 1939, pp. 1450, 1461, 1462.

Solutions for Complete Chemical Analysis in 45 Minutes

■ W. T. Unfried uses the solutions shown in the following table to save time and labor in the laboratory of Texas Electric Steel Casting Co., Houston, Texas. Rapid analysis permits one chemist to complete a carbon steel analysis in about 45 min and a stainless steel in about 90 min.

In his story, which appears on page 86, Unfried presents the basic treatment for steels containing less than 2% chromium, steels with over this amount, and irons with both amounts of chromium. He discusses the preparation of the master solution and the procedures and calculations for determining phosphorous, manganese, chromium, vanadium, nickel, molybdenum and copper.

To use the table, read down the left side to the element of concern; the solutions involved in its determination are given, in proper sequence, to the right.

TO ANALYSE . . . USE THESE SOLUTIONS

SILICON	*Hydrochloric Acid Wash* 75 ml HCl to 1000 ml water				
PHOSPHOROUS	*Sodium Sulphite* 57 gm of the anhydrous salt dissolved in 1000 ml cool water. Do not use for more than one week.	*Ammonium Molybdate* 300 ml sulphuric acid to 700 ml water. Cool to 122F (50C) and add 20 gm ammonium molybdate. Mix well.	*Hydrazine Sulphate* ¾ gm hydrazine sulphate to 500 ml water. Do not keep over 30 days.	*Dilute Perchloric Acid* 40 ml acid diluted to 1000 ml.	
MANGANESE	*Acid Mixture* 250 ml water, 50 ml sulphuric acid, 75 ml phosphoric acid, 100 ml nitric acid, 25 ml 5% silver nitrate solution.	*Ammonium Persulphate* 150 gm ammonium persulphate to 1000 ml water. Keep in stoppered bottle and mix fresh every 2 or 3 days.	*Sodium Arsenite (Standard)* Dissolve 35.5 gm anhydrous sodium carbonate in 400 ml boiling water. Add 11.70 gm arsenious acid (As_2O_3). Cool and dilute to 10,000 ml.		
CHROMIUM	*Potassium Permanganate (Standard)* 7.8 gm to 3500 ml water. Mix one week in advance and filter through asbestos before using.	*Ferrous Ammonium Sulphate (Standard)* Add 450 ml sulphuric acid to 900 ml water. When cool add 225 grams ferrous ammonium sulphate. Dilute to 9000 ml.	*Sulphuric - Phosphoric Acid Mixture* 750 ml water, 500 ml sulphuric acid (allow to cool somewhat), and 500 ml phosphoric acid.		
VANADIUM	*Ammonium Persulphate* 8% in water. Do not use after 24 hours.	*Ferrous Ammonium Sulphate* Same as for chromium	*Potassium Permanganate* Same as for chromium.	*Potassium Permanganate - Standard N/50* 0.6321 gm per liter. Let stand 2 or 3 days then filter through asbestos. Standardize with sodium oxalate.	
NICKEL	*Bromine Water* Saturated solution	*Tartaric Acid* 20% in water	*Dimethylglyoxime* 1% in methyl alcohol	*Sodium Hydroxide* 25% in water	*Ammonium Hydroxide* (3-1) in water
MOLYBDENUM	*Sodium Thiocyanate* 5% in water	*Stannous Chloride* 125 gm stannous chloride in 150 ml HCl. Heat until dissolved and solution clears. Pour into 750 ml cold water. Keep several pieces of mossy tin in the bottle.	*Dilute Perchloric Acid* 750 ml water, 1000 ml perchloric acid.	*n - Butyl Acetate* technical grade	*α - Benzoinoxime* 2% in ethyl alcohol. Filter if not clear. For wash solution, mix as needed 25 ml solution above and 10 ml H_2SO_4. Dilute to 1000 ml.
COPPER	*Acetate Buffer* Dissolve 500 gm ammonium acetate in mixture of 200 ml glacial acetic acid and 400 ml water. Dilute to 1 liter.	*Gum Arabic* 10 gm gum arabic to 500 ml hot water. Stir until completely dissolved. Simmer on hot plate 1 hour. Cool, keep stoppered and refrigerated, or mix fresh daily.	*Rubeanic Acid (Dithio-oxamide)* 0.1% in ethyl alcohol. Stable 2-3 months.		

Language Doesn't Change Casting Defects

The International Committee on Foundry Defects has just published the second book in a series dealing with the most commonly encountered casting defects. Titled *Album de Defauts de Fonderie, Volume II*, the book is available only in the French edition.

Volume I, published in 1952, devoted its attention to defects common to all metals and alloys poured by foundrymen, while the new volume deals exclusively with steel, malleable iron, light metals and copper base alloys.

The book includes a general classification of defects by causes using schematic drawings to indicate the type of condition described. Later sections illustrate the defects with photographs and drawings. Causes and cures for each defect follows the description of the defect.

Hans J. Heine, technical director of the American Foundrymen's Society, states that "the foundryman familiar with the French language should find this a valuable reference work."

Album de Defauts de Fonderie, Volume II, is a 6½ x 9¼-in. casebound volume containing 225 pages. The book is available from AFS for $6.50; if remittance accompanies the order, postage will be prepaid. Write: Book Dept., American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.

Dutch Association Opens Experimental Foundry

The Association of Dutch Foundrymen has announced the opening of an experimental foundry at the Foundry Research Center of the Dutch Institute of Metals (Metaalinstituut T.N.O.) The Netherlands organization states that planning for the new research facility was done during the period 1947-1951, but that it took four years to have plans approved and to raise money necessary for building and equipping the center.

The Foundry Research Center will deal with all problems of casting and special attention will be given to the development of molding methods.

This No. 2 Simpson Mix-Muller prepares all shell sand at Lynchburg Foundry and is one of 7 Simpsons operated throughout their extensive facilities.

List Engineering Graduates For Castings Industry

Graduating engineers interested in careers in the castings industry are listed in two publications recently released by the Foundry Educational Foundation. Listed are not only FEF scholarship students but also voluntary students (elect foundry sequence in FEF schools) and regular students (engineering students in regular courses). Listings include name, addresses (student and home), age and similar personal data, military experience and draft status, work experience (many have worked in foundries), type of foundry work desired, college or university, and course studied.

Listing No. 1 (1955-56 winter graduates) covers 16 future foundrymen. Listing No. 2 (June 1956 graduates) gives facts on 122.

The Foundry Educational Foundation was formed to promote better foundry instruction in colleges and universities and to interest qualified students in careers in the castings industry. Founding members are the American Foundrymen's Society, Gray Iron Founders' Society, Malleable Founders' Society, Non-Ferrous Founders' Society, Steel Founders' Society, and the Foundry Equipment Manufacturers' Association. FEF headquarters are located in Terminal Tower Bldg., Cleveland 13, Ohio.

Canadian Conference Set

5th All-Canadian Foundry Conference under the sponsorship of the Eastern Canada and Ontario Chapters of the American Foundrymen's Society has been scheduled for November 8 and 9 at the Mount Royal Hotel, Montreal, Que. W. T. Shute, Canadian Car & Foundry Co., Ltd., Montreal, has been asked to serve as conference chairman.

Conference appointments include: conference vice-chairman and chairman, Housing & Registration Committee, A. J. Moore, Vanadium Alloy Steel of Canada, Ltd.; program chairman, Mr. Shute; chairman, Program Book Committee, W. P. Sullivan, W. King, Ltd.; and chairman, Finance Committee, L. Guilmette, Canadian Foundry Supplies & Equipment, Ltd.

foundry trade news

Reynolds Metals Co. . . . will expand facilities to the extent of $43,000,000, adding production capacity to both Corpus Christi and La Quinta alumina plants.

General Metals Corp . . . East Oakland, Calif., gray iron plant was ripped by blast February 6 that did $30,000 damage to office building which is part of $5,000,000 plant opened March 1955. General Metals is a subsidiary of Transamerica Corp.

Schneider Pattern Works . . Milwaukee firm headed by Jacob Schneider has taken a company membership in American Foundrymen's Society.

Whiting Corp. (Canada) Ltd. . . . subsidiary of Whiting Corp., Harvey, Ill., has announced purchase of Volta Mfg. Co., Ltd., Welland, Ont., producer of electric furnaces and smelters.

Canton Bronze & Aluminum Fdry. Inc. . . . Canton, Mass., firm has joined Non-Ferrous Founders' Society.

Link-Belt Co. . . . has moved executive office to the Prudential Building, Prudential Plaza, Chicago 1, Illinois.

Huron Mfg. Co. . . . is new name of Master Pattern & Mold Co. Name change came when V. J. Sedlon moved company from Cleveland to Huron, Ohio. Company has added models, jigs, fixtures and general machine shop to their line.

Apex Smelting Co. . . . announced earnings of over $1,500,000 for 1955 which compares with earnings of $441,000 for 1954.

Interlake Iron Corp. . . . nation's largest producer of merchant pig iron paid a 35c dividend March 31.

W. K. Leach takes first Whiting Trackmobile out of Volta plant.

Wilson H. Moriarty (fourth from left) National Malleable and Steel Castings' sales v-p and the management of Fundiciones de Hierro y Acero.

National Malleable and Steel Castings Co. . . Cleveland firm will expand Mexican activity through new agreement with its licensee, Fundiciones de Hierro y Acero, Mexico City.

Simplicity Engineering Co. . . Durand, Mich., producer of screens, feeders and other materials handling equipment has announced 50% increase in plant area.

Rockwell Mfg. Co. . . has acquired the assets of Locomotive Finished Materials Co., Atchison, Kansas, largest steel foundry and machining facility west of the Mississippi. Price and details of transaction were not disclosed.

Vanadium Corp. of America . . has published a folder summarizing plans for future service to customers. Firm is celebrating its 50th anniversary.

Robinson Clay Product Co. . . Akron, Ohio, refractory manufacturer is observing its 100th anniversary.

James B. Clow & Sons, Inc. . . will build cast iron pipe plant with 80,000 ton annual capacity at Bensenville, Ill. Construction of the first pipe plant in the Chicago area is part of $5,000,000 expansion of manufacturing facilities for Chicago firm. New plant will be producing 4 to 16-in. diam. pipe in lengths to 18 ft by mid-1957.

Colonial Metals Co. . . marked its 10th anniversary by dedicating a new, enlarged control lab at its Columbia, Pa. home plant.

Shallway Corp. . . has established a shell molding research and development center at Connellsville, Pa. Research center plans to become "clearing house for the exchange of technical information relating to shell molding."

Apex Steel Corp., Ltd. . . has announced election of the following to its board of directors: E. V. Grover, Robert S. Grover, D. L. Robertson, B. W. Thorne, Jr., D. L. Swinnerton, and C. W. Shay.

Foundry Equipment Ltd. . . British equipment builder will take over manufacture, sale and service of all Magnetic Moulding machines previously

Locomotive Finished Materials Co.: sold to Rockwell Mfg. Co.

produced by British Insulated Callender's Cables Ltd.

Colorado Fuel and Iron Corp. . . has moved its Chicago district sales office and warehouse to 3838 W. 51 St., Chicago 32, Ill.

E. S. Harman Corp. . . Chicago firm has joined American Foundrymen's Society.

Bridesburg Foundry Co. . . Philadelphia, Pa., firm has joined Non-Ferrous Founders' Society.

Indiana Products Co. . . has been appointed Indiana, Michigan and western Kentucky representative for sand handling and sand condition equipment built by Royer Foundry and Machine Co.

Cedarville Foundry . . Cedarville, Ohio, firm has begun manufacture of shot and grit.

Arwood Precision Casting Co. . . Brooklyn, N. Y., firm has joined Investment Castings Institute.

Clark Equipment Co. . . announced the opening of its Materials Handling Development Center, established to develop materials handling methods for individual industries. Center is located in Battle Creek, Mich.

International-Harvester Co. . . Waukesha plant has established best safety record of any U. S. malleable foundry. Previous record was set by same safety-conscious plant.

Allis-Chalmers Mfg. Co. . . has announced record sales, over $530,000,000, in its 1955 report to share owners. Net earnings were $6.05 per share of common stock.

Foundry Trades Equip. & Supplies Assoc. Ltd. . . British metal castings industrial supply group is cooperating in presenting the Mechanical Handling exhibition in London, May 9-19.

Haylco Controls Corp. . . is building a new plant at Neenah, Wis., to house offices and manufacturing facilities for line of automatic moisture controls, mixing cycle controls and bond feeders.

Olin Mathieson Chemical Corp. . . has entered primary aluminum field, but will not produce casting alloys.

Electro Metallurgical Co. . . division of Union Carbide and Carbon Corp. is now celebrating its fiftieth year as producer of ferro-alloys.

for **MORE** and **BETTER** **MOLDS...**

you can't beat the MONARCH

KWIK-STRIP

MECHANICAL CORNER FLASK

Locking handle bolts work directly in a straight line. Handles can be placed in any one of four positions (up and down position shown above). Flask opens, closes and locks with positive straight line action of bolts. Binding on working corner is eliminated. Corner pin guides and springs are completely sealed against sand. All working parts are case hardened and cadmium plated. Draw pins are hard chrome plated, centerless ground and polished for true diameter. Forged and plated guide bushings. Cold Rolled wear strips are standard on top of cope and bottom of drag. Wear strips on parting flanges optional. Sides are flat so flask can be set on edge without danger of tipping.

THIS KWIKSTRIP FLASK will be shown in use at the Foundry Show
Booths 1740-42
1841-43
Aisles 1700-1800

CONSTRUCTION: Precision built from cast aluminum or magnesium. Made with the most modern jigs and fixtures and machine tools to insure accuracy.

AVAILABLE SIZES: 12" width x 4" depth to 30" width x 7" depth; 12" long x 4" depth to 30" long x 7" depth, in increments of one inch. Upsets available in 1" x 2" depths 4° and 5° tapers available.

Cast aluminum or iron jackets available to fit all flask sizes listed above.

"Another Foundry product by"... **NEWAYGO** engineering company newaygo, michigan

FROM INDIVIDUAL UNITS TO COMPLETE SYSTEMS

our job is serving your sand handling needs better

COMPLETE SANDHANDLING SYSTEMS

CAR CONVEYORS

PALLET TYPE CONVEYORS

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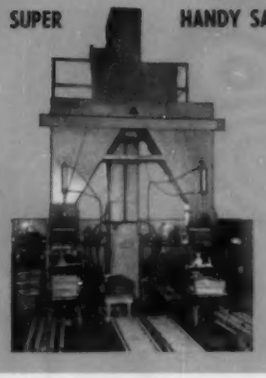

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LITHO IN U.S.A.

Will Report Skill Needs Of Mechanized Foundries

Influence of changing skill requirements in foundries due to mechanization will be determined as a result of a study of 44 shops made by the U. S. Department of Labor's Bureau of Apprenticeship during January. Object is to prepare the castings industry for the marked increase in personnel needs contemplated by 1975. The castings industry was selected as the first of numerous industries to be studied.

A discussion of findings will be held during the 1956 AFS Castings Congress in Atlantic City, May 3-9.

Principal objectives of the study are:

1. To determine the impact of mechanization on training needs, training programs, and other aspects of employee development.

2. To sample the experience of officials in mechanized foundries concerning the solution of manpower and training problems resulting from mechanization of foundry operations.

3. To determine the extent of various types of training programs and other forms of employee development in mechanized plants.

4. To develop recommendations concerning measures that might be taken to better meet the need for employee development in the foundry industry.

The survey program was set up and the 44 mechanized foundries, representing all parts of the United States, were selected at a meeting of castings industry representatives and Bureau of Apprenticeship officials Washington, D. C., last summer. Chairman of the Foundry Committee with the Department of Labor is Fred G. Sefing, International Nickel Co., past chairman of the Education Division of the American Foundrymen's Society.

casting through the ages

10 Big Questions for B&B

■ Brass and bronze foundrymen are expected to fly hammer and tongs into the discussion questions at the brass and bronze round table meeting to be held during the AFS Castings Congress at Atlantic City.

To allow brass and bronze foundrymen to prepare answers to the questions that will be aired at the Friday May 4 meeting, the round table chairman, B. A. Miller of Crown Non-Ferrous Foundry, Inc., has released the questions for advance publication.

The questions are:

1. Due to the present economic conditions, what are the foundry problems when attempting to down grade the copper base alloys:
   a. Does down grading effect maximum section size for the different alloys?
   b. Can same pattern equipment and gating systems be used?
   c. What metal characteristics are affected by down grading?
   d. What additional controls are necessary when down grading?

2. Have there been any new developments in the furnace equipment for melting the copper base alloys?
   a. Indirect arc.
   b. Induction (low and high frequency).
   c. Gas and oil fired furnace (Crucible and open flamed).
   d. Coke fired furnaces.

3. Is it possible to melt and then hold under a charcoal cover copper base alloys (85-5-5-5 especially), for a relatively long period of time, at temperature and still maintain quality of melt?

4. Since the high strength copper base alloys have shown such a rapid growth in their useage during the past year, what foundry practicees are required to maintain high quality in these alloys?
   a. Aluminum bronze
   b. Nickel aluminum bronze
   c. Manganese bronze
   d. Silicon brass

5. What techniques have been developed for repair welding the copper base alloys?
   a. Aluminum bronze
   b. Nickel aluminum bronze
   c. Manganese bronze
   d. Silicon brasses
   e. Red Metals ("G", "M", 85-5-5-5)

6. Are better quality copper base alloy castings being made in the foundry, by the use of—
   (a) The CO_2 process?
   (b) Shell molding
   (c) "D" Process

(d) High pressure molding

7. What percent of combustible materials is allowable in blended sands?
8. What causes the gas holes just beneath the surface of the casting adjacent to the core sections on low zinc alloys; i.e., 80-10-10, 88-10-2-0, 89-11, etc.? What can be done to correst this condition?
9. What have been the practical advancements in the use of the vacuum degassing equipment in the copper base alloy foundries?
10. What can be done to prevent metal penetration into cores?

AFS Aids Touring Spaniards

Nine executives of the metal castings industry in Spain left for their homes on March 4 after a six week tour of plants in New York, Connecticut, New Jersey, Pennsylvania, Ohio, Michigan and Illinois. The tour, sponsored by the U. S. International Cooperation Administration, was intended to supply the men with information and ideas that might advance the metal castings industry in Spain.

The International Cooperation Administration reports that the castings industry of Spain is divided roughly between small highly diversified operations and large specialized plants associated with heavy industry. The U.S. agency indicates that the uneven quality of foundry products, principally in iron and steel castings, has been a drag on Spanish industry generally and has retarded normal progress in specialized fields.

The nine touring Spanish foundrymen are pledged to give direct assistance in organizing and presenting specialized courses in foundry practices upon their return to Spain.

During their visit to the United States, the visitors devoted a day to conferences with Hans J. Heine, technical director of the American Foundrymen's Society.

GIFS Prints Report

Summary of a year's activities in the Gray Iron Founders' Society has been published in the *Proceedings* of the 27th annual meeting of that organization. Headquarters for GIFS is 210 National City–E. 6th Building, Cleveland 14, Ohio.

Open Die Casting Award

Nominations for the Doehler Award, highest prize of the die casting industry are open until April 15. The award is made annually by the American Die Casting Institute for outstanding contributions to the field of die casting.

There are three fields of consideration: technical achievement; advancements in plant operation; and activities not primarily of a technical or operational nature that result in the enhancement of the reputation and acceptability of die casting.

The award consists of a plaque and a cash honorarium of at least $500. The winner will be chosen by June 30 or shortly thereafter, with presentation in September at the Institute's annual meeting.

Entries and requests for additional information should be addressed to Awards Committee, American Die Casting Institute, 366 Madison Ave., New York 17, New York.

Schuh Heads Cupola Research

Dr. A. E. Schuh, U. S. Pipe & Foundry Co., has been elected chairman of the Cupola Research Committee of the American Foundrymen's Society. He succeeds Hyman Bornstein, retired. W. W. Levi, Lynchburg Foundry Co., was elected vice-chairman. Both of the officers elected at the recent meeting of the committee in Chicago will serve two-year terms in office.

The committee voted its appreciation and gratitude to outgoing Chairman Bornstein who has headed the group for the past six years.

Future research plans are now being formulated by the group with the list of potential projects that includes the following: injection process for upgrading iron, oxygen blowing of converter iron, and the study of reactions through use of radioactive isotopes.

Now Where Was That?

■ You will have no trouble locating articles in back issues if you write for the index to 1955 issues of MODERN CASTINGS.

Texas Casting Clinic Scheduled April 20

■ Casting Clinic for ferrous and non-ferrous foundrymen will be held Friday April 20 at the Angelina Hotel, Lufkin, Texas, under the joint sponsorship of the Texas Chapter of the American Foundrymen's Society and the AFS Technical Dept.

Open to all foundrymen whether or not they are affiliated with AFS, no registration fee is required and foundries may send as many representatives to the all-day session as they wish.

Speakers and panel members conducting the clinic are Hans J. Heine, AFS technical director, Harry W. Dietert, Harry W. Dietert Co., and Arthur P. Guidi, F. W. Beckham, and F. W. Jacobs, all of Texas Foundries, Inc. Honorary chairman is L. H. Durdin, Dixie Bronze Co., Inc., AFS regional vice-president.

Clinic program follows:

9:00 am . . *"Casting Design,"* Hans J. Heine. Fundamentals, conversion to castings, redesign for better castings, and product development.

10:00 am . . *"Gating,"* Hans J. Heine. Fundamentals and showing of AFS color-sound motion picture on design of vertical gating systems.

11:00 am . . *"Non-Destructive Testing and Quality Control,"* Joe W. Beckham. Experimental stress analysis, brittle lacquer technique, x-ray, radioactive cobalt, and quality control.

12:15 pm . . Luncheon

1:30 pm . . Plant Visits
Lufkin Foundry & Machine Co., new core room facilities
Texas Foundries, Inc., new steel foundry
MacKay Foundry, Inc., jobbing gray iron foundry

3:10 pm . . Casting Defects Panel. Harry W. Dietert, Arthur P. Guidi, F. W. Jacobs, with Hans J. Heine as moderator. Outline of causes of principal defective conditions and discussion of case histories

4:45 pm . . Closing remarks by Hans J. Heine. Discussion of literature references, movies, slide films, bibliographies, and other material available through AFS

6:30 pm . . Social Hour

7:00 pm . . Dinner

Foundrymen planning to attend are urged to assist in clinic planning by indicating their intention to attend to James R. Hewitt, Director of Customer Relations, Texas Foundries, Inc., P. O. Box 180, Lufkin, Texas.

local foundry news

BILL HUGHES, ELECTRIC STEEL, PHOTOS

Dean E. Shull, Jr., left, Pure Carbonic Co., gave **Oregon Chapter** members the low-down on using the CO_2 process and then showed just how you can do it yourself. Among the 80 AFS members and guests present for this meeting in Portland were 18 students, above, from Oregon State College.

Commemorating 50 years in the metal castings industry, C. D. Yahne, Wolverine Foundry Supply Co., Detroit, accepts an AFS service pin from Clifford Hockman, **Detroit Chapter.**

Ohio State Student O. L. Stewart studies cupola air supply in this baby cupola he exhibited to **Central Ohio Chapter** members. At this recent meeting, fellow student G. B. Greenwood told of his room temperature curing binder for cores and dry sand molds.

Questions from the floor always enliven the evening for the speaker. Here William Ball, Jr., R. Lavin & Sons, fires a question at a meeting of the Cincinnati District Chapter.

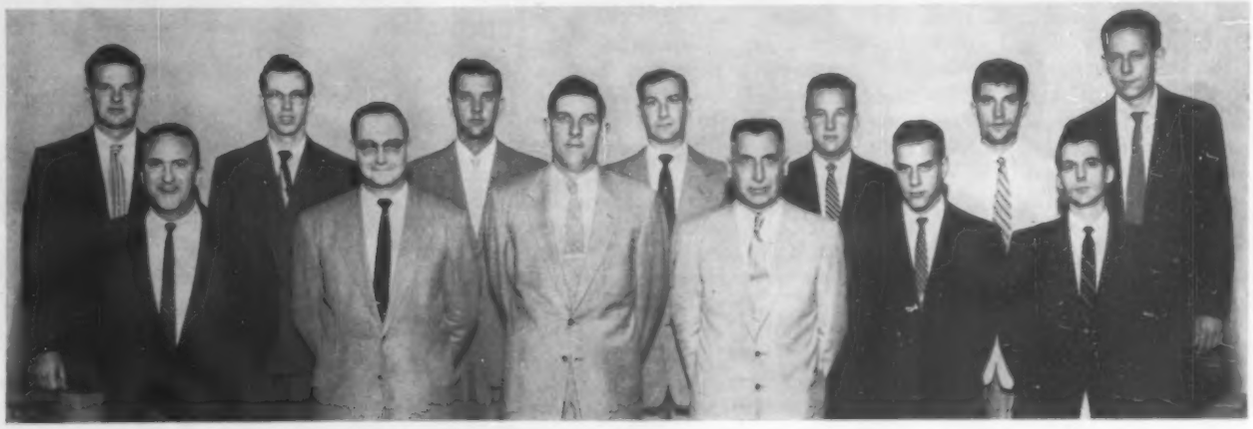
Target for questioners at the February meeting of the Western Michigan Chapter was Wayne H. Buell, Aristo Corp., who spoke to 90 members on core oil evaluation and control.

The members of the **Connecticut Chapter,** above, met in January to hear Hans J. Heine and to meet H. K. Chiang shown at left with chapter chairman Sawtelle. Chiang, from Formosa, is studying at the Naugatuck plant of Eastern Malleable Iron.

LEO HOUSER, DODGE STEEL, PHOTO

Philadelphia Chapter has a big educational program underway, but the general meeting was the immediate concern of chairman Mooney, speaker W. G. Gude, and Arthur Briethaup.

Michigan State University Student Chapter officers are: front, left to right, Jack Macauley; Jack Lane, chairman: Richard Dobbins, industrial advisor; C. C. Sigerfoos, faculty advisor; Rondald Friedman, vice-chairman; Rennie Swope, secretary. Back row, left to right: Marvin Van der Ploeg; Clarence Chambers; Dale Freeman; Walter Rebro; Norman Marine; Carl Lutz; and Robert Cadwaller.



Wisconsin Chapter President P. C. Fuerst (left) poses for conference cameraman with Vernon Thompson, Wisconsin attorney general, a luncheon speaker, and Professor George J. Barker, conference chairman.

Operations Improvements Highlight Badger Regional

Reporting of the Wisconsin Regional Foundry Conference was handled by the co-chairmen of the technical sessions working under the D. N. Gerlinger, Walter Gerlinger, Inc. Conference photos are by Walter Napp, Delta Oil Products Co.

■ Improved operations through planned and progressive research, engineering, and training set the pace for the 19th Annual Wisconsin Regional Foundry Conference. Held February 9 and 10 at the Hotel Schroeder, Milwaukee, the conference was sponsored by the Wisconsin Chapter of the American Foundrymen's Society, the University of Wisconsin, and the Wisconsin Student Chapter.

Conference chairman as Prof. G. J. Barker, University of Wisconsin, who had as co-chairman N. M. Amrhein, Federal Malleable Co. L. J. Woehlke, Grede Foundries, Inc., as program chairman, supervised the planning for the 20 conference technical sessions.

The conference was opened by Chapter President P. C. Fuerst, Falk Corp., who introduced Dean Kurt F. Wendt, U. of W. Dean Wendt outlined the responsibility of engineers in using their knowledge and imagination to improve materials and techniques. The university is responsible for providing a sound background in technology and ethics, he said. Research work on behalf of the castings industry underway at the university includes, he stated, work in mold making, malleable melting, pH of molding mixtures, brittleness in metals, alloying and heat treatment of copper-base alloys, and an AFS sand committee project.

To be progressive, a foundryman needs to take advantage of advances in methods, equipment, and trained men, Hans J. Heine, AFS technical director, said in discussing *"New horizons in Foundry Progress."* Research, which correlates closely with economic growth, he said, will take the following general directions during the next few decades: development of unexploited metals, more effective use of currently available materials, improved metal properties, and discovery of new processes.

Keynote technical speaker was Herbert J. Weber, AFS director of safety, hygiene, and air pollution control. He was introduced by Prof. E. R. Shorey, University of Wisconsin. Mr. Weber discussed legislative trends and outlined protective measures foundries can take in combatting noise. Recent court decisions make U. S. industry liable for billions in loss of hearing claims, he said. Much of his address is covered in the Bonus Section *"The Noise Problem in Foundries"* published in the March issue of MODERN CASTINGS.

Principal speaker at the luncheon following the conference opening was Milton Bruhn, University of Wisconsin football coach. Luncheon chairman was Mr. Amrhein.

Following the traditional pattern of Wisconsin Regionals, the afternoon was devoted to two sets of simultaneous sessions on steel, gray iron, malleable, non-ferrous, and pattern subjects. In the first round of sessions, Clyde A. Sanders, American Colloid Co., spoke on *"Casting Surface Finish, Tolerance, and Precision"* at the steel meeting. Paul B. Hiemenz, Falk Corp., and Donald Helman, Crucible Steel Castings Co., were co-chairmen. For gray iron foundrymen, Prof. Philip C. Rosenthal, University of Wisconsin, reviewed *"Metallography of Cast Iron"* at a session having James E. Burke, Wisconsin Gray Iron Foundry Co., and James C. Wieland, Mid-City Foundry Co., as co-chairmen.

Lyle R. Jenkins, Wagner Malleable Iron Co., discussed *"Processing of Pearlitic Malleable"* at a meeting with Norbert J. Gross, Belle City Malleable Iron Co., and Jack E. Roensch, Chain Belt Co., as co-chairmen. The popular AFS research film *"Effect of Gating Design on Casting Quality"* was shown at the non-ferrous session by Hans J. Heine; co-chairmen were H. W. Zimdards, Waukesha Foundry Co., and E. H. Jagmin, Jr., Ampco Metal, Inc. At the pattern meeting, Martin C. Ehrman, International Harvester Co., spoke on *"Epoxy Plastic Pattern Equipment"* with Irvin Czerwinski, Nelson Pattern Co., and Steve Denkinger, Atlas Plastic & Aluminum Pressure Plate Co., as co-chairmen.

Mr. Sanders emphasized the role of finer sands in securing finer casting finishes and pointed out that good pattern and flask equipment is essential to close tolerance castings. In selecting any process for making castings, he said, consider initial costs of equipment and material, cost to make a finished mold ready for pouring, know precision and control that are required, and determine whether a few thou-

Foundry noise is discussion topic for H. J. Weber, AFS safety, hygiene and air pollution control director (at blackboard) and E. R. Lund, LaCrosse Works, Allis-Chalmers Mfg. Co. Weber was conference speaker.

sandths extra of metal will really be more costly to remove. He commented on "snotters" and showed gating systems designed to eliminate them.

The paper was adapted from a presentation to be made at the 60th AFS Castings Congress & Show and a condensation will appear in the May issue of MODERN CASTINGS.

Characteristic microconstituents in gray and nodular iron were brought out by Prof. Rosenthal. He showed how variations in amount and distribution of these constituents alter such properties as tensile strength, hardness, machinability, and wear resistance, and illustrated the factors in microstructure that are of importance with respect to given engineering properties.

Production of good pearlitic requires technical talent and proper equipment, Mr. Jenkins said. Process control must begin with raw materials and carry on through all phases of production. He placed special emphasis on metal composition control and control of time, temperature, and atmosphere during heat treatment. Pearlite requires much closer control than ferritic malleable, he declared.

H. J. Heine outlined gating and pouring principles developed under the auspices of the AFS Light Metals Research committee and described latest studies applying to vertical gating systems. Recommended system (MODERN CASTINGS, November 1955, pp. 55-56) consists of a tapered sprue with a rectangular cross-section, an enlargement of the runner directly under the sprue, a horizontal extension of the runner past the gate, a flared gate entering the bottom of a side riser, and a continuous web section connecting the side riser to the mold cavity.

Old patterns, with corners and fine details sharpened up, can be reproduced in plastic for half the cost in time and money as new pattern equipment, Mr. Ehrman stated. While plastic patterns break more readily, he said, they can be repaired in three to four hours, and can be strengthened by means of glass cloth laminations. Plastic patterns draw from the sand particularly well, the speaker indicated.

"Welding in the Foundry" by W. G. Rinehart, Harnischfeger Corp., was covered at the steel meeting in the second round of technical sessions. Richard Koch, Wehr Steel Co., and Vince Mickelonis, Grede Foundries, Inc., were co-chairmen. H. W. Schwengel, Modern Equipment Co., discussed *"New Developments in Melting Equipment"* at the gray iron session; co-chairmen were Thomas H. Tanner, Zenith Foundry Co., and Frank M. Kulka, Motor Castings Co.

Malleable founders heard *"Casting Scrap Due to Cores: Cause and Cure"* presented by R. J. Mulligan, Archer-Daniels-Midland Co., at a session with Prof. R. W. Heine, University of Wisconsin, and H. L. Zellner, Chain Belt Co., as co-chairmen. Victor M. Rowell, Harry W. Dietert Co., reviewed *"Synthetic Sand Practice"* for the non-ferrous group; O. Sadofsky, Kenosha Aluminum & Brass Co., and R. Eschner, Lawran Foundry, were co-chairmen. Speaking on *"Pattern Design Specifications"* was H. Wesley Stokes, Kilbourn Pattern Co., Inc.; session chairman was M. C. Ehrman, International Harvester Co.

Electrode manufacturers make electrodes to conform primarily to government and military specifications, Mr. Rinehart said, since foundries have not prepared specifications. He reviewed the problem of cracking after welding and advised preheating all steel castings over 60,000 psi tensile strength and greater than ½ in. thick. Defects in welds or caused by welding which must be avoided include hard spots, porosity, cracking, undercutting and notching, slag inclusions, lack of penetration, and under-bead cracking, he said.

Mr. Schwengel described sever-

Sight screener operated by Grace Quick, RN, International Harvester Co., was part of conference safety, hygiene, and air pollution control display. Allis-Chalmers also demonstrated health and safety measures.

al new closed top cupolas operating in the Detroit area. These are internally water cooled, he said, with three-stage hot blast units designed to give an air temperature of 600 F. Used for large daily tonnages, the units are operated continuously for as long as two weeks, he said.

Blows are caused by gas with no place to go, Mr. Mulligan said in discussing methods of eliminating casting defects due to cores. To get rid of the gas, use coarser sand (new sand, not coarser grade added to old sand), vent cores through molds, check wash (don't wash core print), make sure you're not underbaking. Hot tears caused by cores can be eliminated by improving collapsibility, improving hot deformation, correcting arbors, rods, and wires that may inhibit core collapse. Cuts and washes, he said, call for remedies opposite to those for hot tearing.

Synthetic sand gives the nonferrous founder the advantage of hard ramming, low moisture, high green strength, and better control of properties, Mr. Rowell explained. For best results, mix the sand each time before using, he said. Control moisture carefully since green strength and permeability both change markedly with variations in moisture, he advised.

Patterns for semi-production and production were considered by Mr. Stokes, who concentrated on the problem of producing accurate patterns for accurate castings. Trend, he said, is toward closer tolerances, better looking castings, and in most cases—machined patterns. Wood production equipment should be made of mahogany or other suitable hardwood. Coreboxes should be metal faced and loose pieces should be lined with metal at wearing surfaces or should be made of aluminum. Aluminum cope and drag plates can be pressure cast and scraped or sand cast and machined. Pattern sand castings should be normalized; wall thickness should be at least ½ in., Stokes said. On driers weighing 2½ lb or more, he recommended 3/16 in. wall sections and ribbing with additional metal at dowel pin holes; on lighter driers ⅛ in. sections are adequate.

The conference banquet, with Chapter President Fuerst presiding, concluded the first day's activities. Principal speaker was Dr. Charles E. Irvin, Michigan State University; his subject, *"A Management is as Good as Its Words."*

Good communications within plants are essential to successful operations and labor relations, Dr. Irvin declared. Management cannot do the job in human engineering that it has done in mechanical engineering without improving communications. He emphasized the importance of being instructive, interesting, and inspirational in oral communications. Criteria of good written communications are accuracy, brevity, and clarity.

Second day of the Wisconsin Regional offered foundrymen two more rounds of technical sessions and a lunch with Vernon Thomson, Wisconsin attorney general, as speaker. Prof. Barker presided at the luncheon. Arthur A. Agostini, Grede Foundries, Inc., introduced the speaker.

Speakers and their subjects at the morning series of sessions were:

Steel—*"Magnetic Particle Inspection of Steel Castings,"* Frank S. Catlin, Magnaflux Corp. Emil Martinek, Maynard Electric Steel Castings Co., and Donald Helman, Crucible Steel Castings Co., were chairmen. Gray Iron—*"Gating and Risering,"* Harry H. Kessler, Sorbo-Mat Process Engineers; co-chairmen were J. J. Broecker, Lakeside Malleable Castings Co., and A. Lebesch, Allis-Chalmers Mfg. Co.

Malleable—*"The Duplex Method of Melting,"* Eric Welander, John Deere Malleable Works, Deere & Co. Donald E. Feather, Appleton Electric Co., and Leonard E. Brooks, International Harvester Co., were co-chairmen. Non-Ferrous—*"Brass and Bronze Quality Control,"* F. L. Riddell, H. Kramer & Co. Co-chairmen were L. Oertel, Racine Aluminum & Brass Co., and W. Puzach, Ampco metal, Inc. Pattern—*"Production Pattern Equipment used at Caterpillar Tractor Co.,"* Robert L. Selberg, Caterpillar Tractor Co. Gilbert J. Willms, Trackson Co., and Frank Gauer, Falk Corp., were co-chairmen.

Approaching non-destructive testing from the standpoint of increasing sales and profits for foundrymen, Mr. Catlin said designers generally know less about castings than any product they are working with, but if a casting is properly designed it is often the best and most economical component. Most serious stress is bending, he indicated. Stresses that cannot be calculated can be studied experimentally by means of brittle lacquer techniques which can also serve as a guide to critical areas of special interest to the inspection department. Catlin also described magnetic particle and fluorescent penetrant inspection methods.

Procedure for planning risering and gating systems for gray iron castings was outlined by Mr. Kessler. To get sound castings, he emphasized, run uniform metal composition from tap to tap year in and year out, riser if necessary, use chills when required, and change the design if all else fails.

Duplex melting gives the malleable foundryman a constant supply of iron at a lower cost per ton (fuel and raw material costs are lower than cold melting), but

continued on page 122

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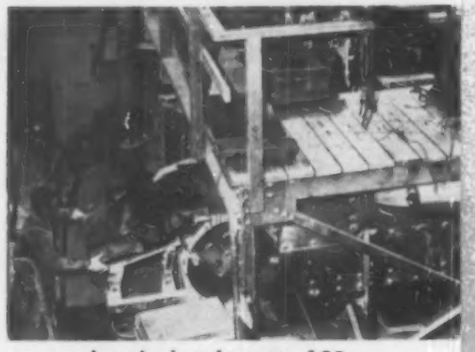

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CIRCLE NO. 162, PAGE 115-116

Coleman Scholarship Goes to Kenneth E. Reisch

■ The Philadelphia Chapter of the American Foundrymen's Society has awarded the first William B. Coleman Scholarship to Kenneth E. Reisch, senior student in Industrial Engineering at the Pennsylvania State University.

This scholarship has been established in recognition of the service to the foundry industry of William

K. E. Reisch

B. Coleman, first chairman of the Philadelphia chapter and subsequently secretary - treasurer. The award is to be made annually to a senior at Penn State majoring in industrial or mechanical engineering or in metallurgy. Its purpose is to help worthy students in acquiring an engineering education, and to contribute to the development of foundry science and technology.

The scholarship carries an award of $500, half made available at the start of the first senior semester and the rest given at the start of the second term. The recipient is judged on the following qualifications:

Past academic achievement as evidenced by rank in upper two-fifths of his class;

Desirable personality and character traits;

Evidence of leadership;

Participation in extracurricular activities;

Past association with the foundry industry;

Interest in the foundry industry; and

Financial need.

These requirements were compiled by Clyde Jenni, General Steel Castings Co., E. C. Troy, W. A. Morley, Olney Foundry Div., Link-Belt Co., and G. H. Bradshaw, U. S.

Naval Base, Philadelphia.

It works this way: every year the university will review all applications and choose four students to be nominated for the award. The university committee will report the names of these nominees, arranged in order of preference, together with detailed information about their qualifications and other pertinent data, to the Scholarship Committee of the Philadelphia Chapter. The chapter's committee will then decide who will receive the award; they will also choose one alternate. Formal announcement of the scholarship recipient will be made during the Honors Day program of the College of Engineering and Architecture.

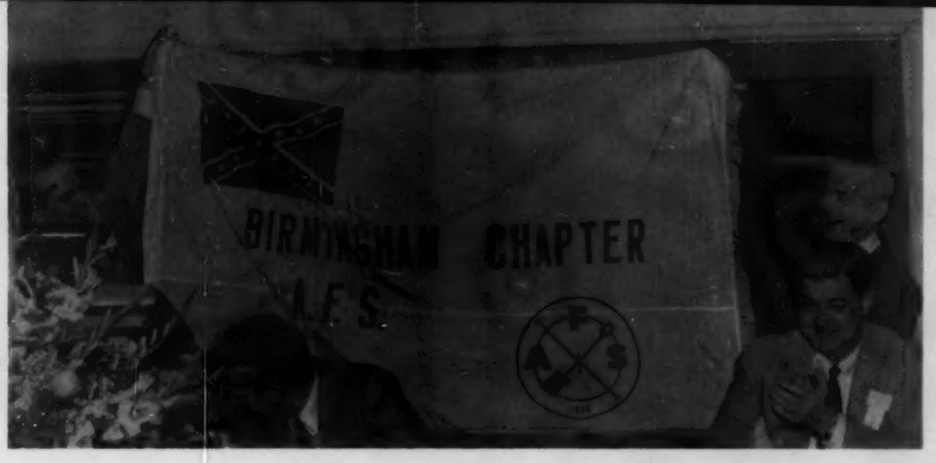
The Chapter Scholarship Committee consists of the past three chapter chairmen in order of seniority. In this way it has a new chairman every year, and one who is thoroughly familiar with the duties. The first chairman of the committee (1954-55) was Clyde Jenni, with G. H. Bradshaw and W. D. Bryden, Philadelphia Bronze & Brass Corp., as members. This year's committee is headed by Mr. Bradshaw, with Mr. Bryden and D. E. Best, Bethlehem Steel Co., as members.

The background of recipient Reisch stacks up pretty well against the qualifications. He was born May 7, 1929, in Reading, Pa., although he calls Mohnton, Pa., his home town. He stands 6 ft 1, and weighs 185 pounds. He's married and has two children.

His background is chiefly that of a machinist—he served a four-year apprenticeship for journeymen machinists before entering college, and after a year at Wyomissing Polytechnic Institute worked as machinist and time study man for Textile Machine Works in Reading.

Following two years in army ordnance, he took up industrial engineering at Penn State, with a minor in foundry. He stands in the upper fifth of his class, good enough to make Alpha Pi Mu, the industrial engineering honor society.

Answer questions by sending for data describing the newest products and processes. Order by using the cards on **page 115-116.**



Conference highlight was flag presentation by AFS President Bruce Simpson (left) with assist from General Manager Bill Maloney. Ducking to give audience a good view of flag is Vice-President Frank W. Shipley while Regional VP Lew Durdin applauds.

Tell New Foundry Techniques At Southeastern Regional

HERBERT F. SCOBIE / *Editor*

■ Some 500 foundrymen from 20 states gathered at the Tutwiler Hotel in Birmingham, Ala., February 16 and 17 for the 24th Southeastern Regional Foundry Conference, oldest continuous regional meeting of foundrymen. Staged under the sponsorship of the Birmingham District and Tennessee Chapters and the University of Alabama Student Chapter of the American Foundrymen's Society, the conference included a series of technical sessions on new molding and coremaking methods, job evaluation, refractories, melting, sands, cleaning castings, and the new injection technique for upgrading iron. A number of Birmingham-area plants were open for visits by conference-goers and a ladies program ran concurrently with the technical meetings.

John F. Drenning, Kerchner Marshall & Co., headed the Program Committee for this year's conference. Mrs. T. H. Benners supervised arrangements for the ladies activities.

Heading large delegations to the conference from their respective chapter areas were A. J. Fruchtl, W. Thomas Barr Associates, chairman of the Birmingham District Chapter, and Wm. B. Greiser, Ross-Meehan Foundries, chairman of the Tennessee Chapter.

The conference opened with a discussion of shell cores by Ray Olson, Shell Process Inc. Shell core he said, will have a greater impact on the castings industry than shell molds in pointing out that they have smoothness, accuracy, collapsibility, economy, and extremely high permeability. Other advantages named include elimination of core plates and driers, elimination of core ovens, and minimum sand, binder, and handling requirements.

Olson described transverse core strength experiments in which a 3-in. OD core was blown with walls ranging down to 3/16 in. Held in molds with an 18-in. unsupported length, the cores showed no deflection in molten cast iron down to a core wall thickness of ¼ in. Investment time can be cut down by as much as 50 per cent through use of coated sand, he indicated. Use a sub-angular sand without pan material for best results with coated sands, Olson stated, to avoid thermal shock and cracking. Trend is toward coarser sands, the fine sand originally used in shell molds not being required, he declared, in recommending selecting a core sand that makes a good molding sand as in solid core practice.

W. Thomas Barr, W. Thomas Barr Associates, presided at the shell core session.

Job evaluation is a management tool to be developed and used by management alone, Milton E. Annich, American Brake Shoe Co., stated in the next session presided over by C. J. Pruet, McWane Cast Iron Pipe Co. Anyone can set up his own job evaluation plan, the speaker pointed out. If you don't have it now start promptly because you'll have to have job evaluation someday, he warned.

Annich presented three different plans for job evaluation used in various divisions of his company and pointed out how each is best suited to a given set of conditions. The factor comparison plan is more difficult to install but is preferable to the point system, he said. However, a company may wish to start with the point system with the idea of converting to the factor comparison plan after wage rates are in line.

Never rate a man, rate the job, Annich advised. If you consider the man, you are making a merit rating not a job evaluation. Evaluations cannot be standardized without a job description, he stated. He cited the AFS publication TIME AND MOTION STUDY FOR THE FOUNDRY as a source of authentic information and examples of application of foundry job evaluation.

At the first day's luncheon, Bruce L. Simpson, National Engineering Co., national president of AFS, presented flags to the Birmingham District and Tennessee Chapters in recognition of their leadership in membership growth since July 1, 1955. Chapter chairman Fruchtl and Greiser accepted the flags for the Birmingham and Tennessee groups, respectively.

Membership of AFS is highest in its history, standing at 12,002 on the first of February, AFS Vice-President Frank W. Shipley, Caterpillar Tractor Co., announced. Dis-

BIRMINGHAM REGIONAL CONFERENCE PHOTOS BY GLENN JOHNSON, U. S. PIPE & FOUNDRY CO.

Ladies program started with registration at Tutwiler.

cussing the importance of regional meetings, he referred to them as training sessions. Training is necessary, he stated, for continued advances in foundry technology.

AFS General Manager Wm. W. Maloney urged attendance at the 60th AFS Castings Congress and Show in Atlantic City May 3-9. The huge exhibit is a sellout, he said, with many exhibitors taking larger space than they have in the past to accommodate operating displays. The more than 100 technical committees of AFS have come up with an outstanding series of papers, shop courses, and round table luncheons that keeps pace with this year's exhibit and insures that everyone coming to the Congress will carry away worthwhile ideas for "The Foundry of Tomorrow." This is the theme of the Congress, he said, set with the problems of competition in the economy of today's high production in mind.

Mr. Fruchtl presented Messrs. Simpson, Shipley, and Maloney with bronze bookends cast by members of the University of Alabama Student Chapter.

"Selection and Preparation of Sands for Foundry Use" was the subject of Earl E. Woodliff, Foundry Sand Service & Engineering Co., at the first afternoon session. Presiding was Charles S. Chisolm, Wheland Co. Leading off with a discussion of grain distribution, the speaker said that 200 and 270 mesh and pan material—classed as fines—reduce the permeability of a molding sand mixture but have little influence on finish. As finer sands are used in an effort to achieve smoother surfaces, it is advisable to go to a finer grind of mold coating, he said. Pipe shops, he stated, seem to get better results with combinations of Mississippi or Tennessee sands with either Alabama or Indiana sands.

Avoid expansion type defects, Woodliff said, with stabilizers such as wood flour, seacoal, and similar combustible materials. These are especially needed, he indicated, in compounded (synthetic) sands which have inherently high expansion characteristics. He also recommended improving expansion and drying out properties by using some natural clay (10 per cent of total clay content). In closing, Woodliff

suggested that the castings industry needs more sand control engineers.

You can get more precise castings, T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., said at the next session, through high mold density even though the mold hardness does not increase appreciably over previous molds. Morris Hawkins, Stockham Valves & Fittings was session chairman.

Barlow outlined the techniques of pressure molding, indicating that the so-called high pressure molding actually refers to pressures on the sand of 80-100 psi and higher whereas usual molding pressures are in the range of 10-60 psi on the mold although line pressures are considerably higher. He described the use of diaphragm molding equipment which tends to force the sand perpendicular to the pattern faces thus giving the mold uniform throughout.

Sand for pressure mold, Barlow said, must have high flowability with moisture in the range of 1½-4½ per cent. Patterns must be smooth, may have no tool marks, and must be devoid of even the slightest backdraft, he warned.

Final technical session of the first day featured a discussion and demonstration of the CO_2 process of hardening molds and cores by Roy Carver, Carver Foundry Products Co. Prof. Warren C. Jeffery, University of Alabama, presided at the session. The speaker made and hardened cores in minutes while the audience looked on. He also showed a movie of CO_2 high production core making methods.

First day activities concluded with foundrymen and their ladies attending a reception and buffet supper at the Mountainbrook Country Club.

The entire morning of the second day was open for visitation of 27 Birmingham District foundries and suppliers to the castings industry.

Plants open were: Alabama By-Products Corp., American Brake Shoe Co., American Cast Iron Pipe Co., Anderson Brass Works, Inc., W. J. Bullock, Inc., Caldwell Foundry & Machine Co., National Cast Iron Pipe Div. of James B. Clow & Sons, Continental Gin Co.,

products and processes

continued from page 18

and gases. 1-3/4" diam, 1/3 oz Spot Check is accurate within ±2%. *Pacific Transducer Corp.*

CIRCLE NO. 47, PAGE 115-116

Castable insulating mix. Franco Lite Cast Block Mix is applicable where there is a need for the insulating value of a refractory, as in metal transfer, where the material is subjected to hot face temperatures no greater than 1700 F. Technical data available. *J. H. France Refractories Co.*

CIRCLE NO. 48, PAGE 115-116

Industrial fans. New streamlined series 106 V-belt drive, adjustable discharge to 47,000 cfm, static pressures to 18" and self-contained units to 23,000 cfm at 10"; also fixed discharge units to 125,000 cfm against 18" pressures; direct connections for limited sizes. *American Blower Corp.*

CIRCLE NO. 49, PAGE 115-116

Inert gas welding controls, portable automatic for torch and back-up gas, torch and fixture cooling water, high-frequency starting spark and welding current for helium, argon, and CO_2 shielded arc welding using conventional welding machines. *Flexweld Mfg. Co.*

CIRCLE NO. 50, PAGE 115-116

Portable lift is a platform truck, straddle fork truck, portable elevator and shop crane. 1-ton capacity, manually propelled, hand or battery-powered hydraulic lift. Remote controls with powered unit. *Oster Mfg. Co.*

CIRCLE NO. 51, PAGE 115-116

Concrete floor repair with new Stone-set compound requires only 40 min from troweling to traffic. Complete in one container, can be applied between shifts or at lunch time. Excellent for anchoring machines and bolts to concrete. No primer needed. *Stonhard Co.*

CIRCLE NO. 52, PAGE 115-116

Motor driven trolley for electrically powered hoist is lightweight, single speed, push button controlled Series 700 LoadLifter in 1000-12,000 lb capacities and 25-130 fpm traverse speeds. 2-hr installation claimed. *Manning, Maxwell & Moore, Inc.*

CIRCLE NO. 53, PAGE 115-116

First Ironworks Opens

Saugus Ironworks Restoration, 300-year-old birthplace of America's iron and steel industry, will open for the 1956 tourist season April 17. Built more than 130 years before the American Revolution, the works was rebuilt in 1954 at a cost of more than $1,500,000 in research and construction. Last year 17,500 persons from every state and 13 foreign countries saw the restoration as it appeared in 1650. Although no iron is made today, much of the restored equipment, including seven waterwheels, operates. The stone blast furnace was built with many of the stones used in the original furnace.

Located 10 miles north of Boston, the Saugus Ironworks Restoration is open from 9 am to 4 pm daily, except mondays, from April 17 through November 30. Admission is 50 cents for adults, 25 cents for children. Trained guides explain how the ironworks operated.

Metals Institute Meeting

The second annual Metals Institute will be held on the campus of Oklahoma A&M, Stillwater, on May 7-8. It will offer high level technical instruction, featuring nationally known specialists in the field of metallurgy speaking on technical phases. It will be aimed at top personnel in metallurgical design, research, processing, and manufacturing. For details write Prof. B. M. Aldrich, Coordinator, School of Mechanical Engineering, Oklahoma A&M College, Stillwater, Okla.

Form Pattern Committee

Patternmakers of the Northwestern Pennsylvania Chapter of the American Foundrymen's Society have formed a committee to assist local foundries with pattern problems and to develop information of general castings industry interest for publication in MODERN CASTINGS. Headed by O. C. Bueg, Arrow Pattern & Engineering Co., the committee includes the following, all from Erie, Pa.: Ronald W. Lewis, Griswold Mfg. Co., Robert A. Slagter, Bucyrus-Erie Co., Arthur E. Will, Arthur E. Will Pattern Co., and J. J. Herrmann, Gen. Electric.

Dimick Casting Co., Dixie Bronze Co., East Birmingham Bronze Co., Foundry Service Co., Goslin-Birmingham Mfg. Co., and Hill & Griffith Co.

Other plants open for visitation included: Harbison-Walker Refractories Co., Jefferson Foundry Co., Laclede-Christy Div. of H. K. Porter Co., Pressure Cast Products Co., Production Foundries Div. of Jackson Industries, Republic Steel Corp., Southern Precision Pattern Works, Thomas Foundries, Inc., City Blast Furnace of U. S. Pipe & Foundry Co., Pipe Works of U. S. Pipe & Foundry Co., Wallwork Foundry Co., Woodward Iron Co., and McWane Cast Iron Pipe Co.

Two simultaneous sessions featuring L. L. Gill, Harbison-Walker Refractories Co., speaking on ferrous refractories, and D. L. LaVelle, Federated Metals Div., American Smelting & Refining Co., speaking on aluminum foundry practice, opened the technical sessions the afternoon of the second day. Presiding at the refractories session was Sam F. Carter, Jr., American Cast Iron Pipe Co.; Arthur Orazine, Jr., Anderson Brass Works, Inc., was chairman of the aluminum session.

Careful selection of the most suitable type of refractory to meet specific requirements makes possible operation of furnaces at their maximum economical limit with minimum loss in production due to shutdowns for repairs, Mr. Gill said. For acid cupolas, high duty fireclay type blocks are most common although in some foundries highly siliceous fireclay block and in some few cases a silica brick is used.

When basic linings are installed, Gill advised, provide expansion joints of soft wood or cardboard to allow for the approximately ⅛ in. per foot of expansion. Put these joints in the melting zone, but not in the well to avoid possible leakage, he warned. He said refractory gun mixtures for daily maintenance result in lower overall operating costs.

A special class of super-duty fireclay refractories is widely used for malleable bung service, Gill said. Highest quality bung brick can be severely damaged if not carefully installed in the bung frames, however, he warned. Ma-

jority of air furnace bottoms are not built of super-duty fireclay brick according to the speaker.

For direct arc furnaces commonly used in steel foundries, Gill described three different methods of constructing furnace roofs.

Mr. LaVelle, in reviewing melting and casting procedures for aluminum alloys, pointed out that the small difference in density between the metal and its oxides requires considerable care in pouring and transferring to prevent mixing of the metal with the dross. Aluminum alloys are more sensitive to improper gating than brass, he said, since shrinkage is readily caused by hot spots which result from poor distribution of the metal flowing into the mold cavity. Use of too few gates is a common aluminum founding fault. Defective castings, he declared, are caused almost equally by bad pouring practice and poor gating.

The two groups met jointly for a discussion of casting cleaning methods presented by A. L. Gardner, Pangborn Corp. Ray F. Frings, Ray F. Frings Co., was session chairman. Dividing cleaning room problems into miscellaneous large, batch, fragile, and straight production work, the speaker described early sand blast machines and outlined the evolution of airless blast equipment. The latter, he said, has far higher abrasive handling ability and requires less horsepower than the pneumatic blast machines. He outlined applications of blast rooms, and turntable, tumbling type, and continuous equipment.

Follow the manufacturer's instructions regarding preventive maintenance, Gardner recommended, checking vanes and other parts according to the time schedule recommended. Use the right abrasive and keep it clean, he said.

Two simultaneous sessions concluded the technical meetings of the conference. Speaking on the injection process of upgrading iron was G. P. Dahm, Linde Air Products Co. M. D. Neptune, James B. Clow & Sons, presided. William L. Ball, Jr., R. Lavin & Sons, spoke on effect of melting on brass and bronze quality at a session chairmanned by J. B. Lankford, East Birmingham Bronze Co.

Mr. Dahm outlined the princi-

ples involved in injection of finely divided calcium carbide into molten iron by means of nitrogen to get sulphur contents of less than 0.015 per cent. The technique has also been used to introduce carbon and to make nodular iron. Foundries ranging from small job shops to large captive shops are using the injection process, he said, for castings ranging from 1 lb to 25,000 lb.

Most plants, Dahm said, desulphurize only certain ladles, but semi-continuous treating installations are also in use. He described a number of actual installations. For increasing carbon content, a mixture of electric furnace graphite powder and calcium carbide is used. Upgrading (nodulizing) injections tend to be long with resultant temperature losses, but a new mixture currently being field tested is expected to reduce time and cost, the speaker declared.

Heavy non-ferrous alloys were grouped according to composition into categories that call for characteristic melting, fluxing, and gating and risering techniques by Mr. Ball. He advised sticking to foundry fundamentals. Do not overlook the simple answers to problems in a search for new materials and processes that seem to be panaceas, he said.

The 24th Southeastern Regional Foundry Conference concluded with a banquet at which John W. Pendleton, academic assistant to the president, University of Alabama, spoke on *"Outlook for Education."* Tom Sims was toastmaster while Mr. Fruchtl, Birmingham District Chapter chairman, presided.

Mr. Pendleton reviewed some of the university's problems arising because of the huge increase in enrollments expected during the next 25 years. Faced by all schools at all levels of education is the prospect of 50 per cent or greater increase in student body by 1960. He estimated that half of the college graduates of the next 15 years would have to enter the teaching profession to satisfy the demand for teachers. Unfortunately, he pointed out, educational institutions cannot vie with industry for graduates.

Conference committee members

who planned this year's Southeastern Regional were:

Program—John F. Drenning, Kerchner Marshall & Co., chairman; Sam F. Carter, American Cast Iron Pipe Co., co-chairman; M. D. Neptune, James B. Clow & Sons; Morris Hawkins, Stockham Valves & Fittings, Inc.; J. B. Lankford, Jr., East Birmingham Bronze Co.

Registration—E. A. Brandler, Electro metallurgical Co., chairman; T. E. Bondurant, Linde Air Products Co.; C. R. Kellerman, Lodge Manufacturing Co.

Greeters—W. Guy Bagley, Woodward iron Co., chairman; J. E. Williams, U. S. Pipe & Foundry Co.; James V. Fairley, Alabama By-Products Corp.; G. Frank Anderson, Tennessee Products & Chemical Corp.; W. D. Davis, Sewanee Coal & Supply Co.

Plant Visitation—W. Harry Bailey, Alabama By-Products Corp., chairman; G. Brant Shelburne, Republic Steel Corp.; Jerry Hoffman, Alabama By-Products Corp.

Publicity—A. B. Schwarzkopf, Bessemer Pipe Plant, Div. of U. S. Pipe & Foundry Co., chairman; J. R. Cardwell, Stockham Valves & Fittings, Inc., co-chairman; C. S. Willcox, Willcox & Allen Co.; Paul Sullivan, G. T. Johnson, O. S. Cooper, Jr., and Stanley Gurak, all of U. S. Pipe & Foundry Co.; Joseph F. Delaney, Eureka Foundry Co.

Arrangements—C. C. Salvage, James B. Clow & Sons, chairman; Robert A. Miller, National Cast Iron Pipe Div., James B. Clow & Sons, co-chairman; Joe Vaught, McWane Cast Iron Pipe Co.; Phillip E. Lankford, East Birmingham Bronze Foundry Co.; L. C. Rotton, National Cast Iron Pipe Div., James B. Clow & Sons; S. A. Vowell, Jackson Industries, Inc.; Conrad G. Bonham, National Cast Iron Pipe Div., James B. Clow & Sons.

Entertainment—Wesley J. Estes, U. S. Pipe & Foundry Co., chairman; James Minter, A. P. Green Fire Brick Co., co-chairman; E. M. Whelchel, American Cast Iron Pipe Co.; W. K. Bach, Foundry Service Co.; H. G. Foster, U. S. Pipe & Foundry Co.; Arthur Orazine, Jr., Anderson Brass Works, Inc.; A. S. Glidewell, Jackson Industries, Inc.; James V. Fairley.

Membership—Henry J. Guthrie, DeBardeleben Coal Corp., chair-

man; Aubrey M. Garrison, Jr., T. H. Benners & Co., co-chairman; R. C. Brumback, U. S. Pipe & Foundry Co.; John E. Granger, U. S. Pipe & Foundry Co.; W. A. Quenelle, Alabama Pipe Co.; Douglas Ferguson, M & H Valve & Fittings Co.; J. W. Bryant, Newbury Manufacturing Co.; Kenneth W. Widener, Attalla Pipe & Foundry Co., Inc.; James T. Sparrow, Jr., Alabama By-Products Corp.; Ralph Carlson, American Cast Iron Pipe Co.; J. G. Lovell, Stockham Valves & Fittings, Inc.; E. L. White, James B. Clow & Sons; Ernest R. Graham, McWane Cast Iron Pipe Co.; Mark M. Adkison, Jackson Industries, Inc.; Seldon Andrews, Central Foundry Co.; Harry C. Reich, Harry H. Reich Co.; Arthur Orazine; R. B. Carr, Lee Brothers Foundry; Jesse F. Yeates, Jr., DeBardeleben Coal Corp.; V. O. Nails, Alabama Pipe Co.

Educational—Ray F. Frings, Ray F. Frings Co., chairman; Dan B. Dimick, Jr., Dimick Casting Co.; E. H. Phelps, American Cast Iron Pipe Co.; C. J. Pruet, McWane Cast Iron Pipe Co.

Finance—M. L. Carl, U. S. Pipe & Foundry Co., chairman; L. H. Durdin, Dixie Bronze Co., Inc.; R. L. Jackson, Jackson Industries, Carl A. Fischer, Jr., Fischer Supply.

Wait till Harry puts this one on the shake out.

France Plans Foundry Congress

The 29th French Foundry Congress will be held at Charleville, May 28 to 30. Among principal papers scheduled for presentation at the session is "*Account of a Mission to the U.S.A.*, covering *the Making of Malleable Cast Iron*," by Mr. J. Menat.

continued from page 108

capital expenditure is greater, Mr. Welander pointed out. Labor costs are one-third less with duplexing, he added. Composition control must start with the cupola. The air furnace functions as a reservior and mixer, provides a reduction in carbon of 10 to 20 points, and raises the temperature 100-150 F, according the Welander.

Metal, mold and core materials, fuel, refractories—all raw materials —must be checked for quality as the first step in control of non-ferrous casting quality, Mr. Riddell said. Operations must also be under continuous control, he stated, and told how to make the most of temperature measurements of molten metal, fracture tests for melt quality, the zinc test for air-fuel ratio, and simple tests for sand and mold properties.

A former patternmaker located in the engineering department acts as casting consultant to design engineering and layout men, Mr. Selburg said, in describing the close relationship between pattern shop, foundry, and engineering at Caterpillar Tractor Co. This man looks for and corrects design faults that increase production costs, investigates molding methods and materials and advises on casting methods (sand and metal mold) and is especially valuable in casting designs involving patterns to be made by outside vendors. Discussing faking, the speaker said Caterpillar uses a ⅛ in. shrink on cylinder clock patterns but only ¹⁄₁₀ in. on sore boxes because the cores expand when surrounded by molten metal.

Final round of sessions featured the following: Steel—*"Deoxidation of Steel for Castings,"* F. W. Boulger, battelle Memorial institute. D. A. Lucas, Stainless Foundry & Engineering Co., and A. M. Herrmann, Belle City Malleable Iron Co., were co-chairmen. Gray Iron —*"Every Foundry Can Have Improved sand,"* Earl E. Woodliff, Foundry Sand Service Engineering Co. Co-chairmen were Carl J. Risney, Risney Foundry equipment Co., and Eric C. Wussow, Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co.

Malleable—*"Scrap Reduction Methods,"* Cy Semrau, Hill & Grif-

fith Co. William Haase, Lakeside Malleable Castings Co., and Walter Divan, Badger Malleable & Mfg. Co., were co-chairmen. Non-Ferrous—*"Information Panel,"* L. Andres, Lawran Foundry, moderator, Hans J. Heine, AFS technical director, F. L. Riddell, H. Kramer Co., and Victor M. Rowell, Harry W. Dietert Co. Co-chairmen were E. H. Jagmin, Jr., Ampco Metal, Inc., and R. W. Eck, Eck Foundries, Inc. Pattern—*"Pattern Equipment for Shell Molds and Shell Cores,"* Harry Weaver, Brillion Iron Works. Mike C. Frankard, J. E. Gilson Co., and H. Wesley Stokes, Kilbourn Pattern Co., Inc., were co-chairmen.

Aluminum is the best deoxidizer, Mr. Boulger said, and enough should be added to give 0.02-0.04 per cent acid soluble aluminum. Adding aluminum in an iron tube increases aluminum recovery and decreases inclusions, he stated.

Trend toward finer sands brings with it a need for more control, Mr. Woodliff said, in advising weighing all ingredients of sand mixtures. Sand mixing equipment should be kept clean and in good repair, he indicated. Elimination of riddling has not been good and excessive removal of fines by exhaust systems has been detrimental. Overmulling, a common error in sand preparation according to the speaker, reduces hot strength.

A good scrap reduction program calls for accurate records, sand and metal control, a keen interest on the part of management sufficient to institute a definite program, daily scrap inspection, and common sense, Mr. Semrau said. Review rigging before changing sand mixtures, he advised. Check shifters and jacket men to make sure they are doing their job correctly, and check flasks and bottom boards. Consider using shell cores to overcome hot tears and cracks. Pour hot iron from preheated ladles. In batch melting, clean sprue to speed melting and to get hotter iron, he suggested. Don't change standards or your established practice without an intensive investigation, he concluded.

In handling a number of questions from the audience, the non-ferrous panel emphasized the importance of quality control, recommended making gates and risers a permanent part of the pattern, advised careful control of pouring temperatures in elimination of shrinkage, and brought out the value of vacuum degassing of aluminum heats.

Detailed drawings are made of all pattern and core box equipment for shell molds, Mr. Weaver stated. Draft is always indicated and shrinkage is always added so that the patternmaker or tool and die maker can work to exact dimensions. Most satisfactory pattern material has been a normal gray iron with a little nickel and chromium added. Pattern surfaces are polished and all back draft is eliminated. Pattern plates 1½ to 2 in. thick are preferred because they maintain uniform temperatures. Patterns may be an integral part of the plate or may be inserts, Weaver indicated.

1956 Wisconsin Regional Foundry Conference officials, in addition to Messrs. Fuesrt, Barker, and Amrhein, included:

Program—L. J. Woehlke, Grede Foundries, Inc., chairman; Gray Iron—J. E. Burke, Wisconsin Gray Iron Foundry Co., and J. J. Broecker, Lakeside Malleable Castings Co.; Malleable—P. R. Martin, Milwaukee Malleable & Gray Iron Works, and Prof. R. W. Heine; Steel—Don Helman, Crucible Steel Castings Co., and E. A. Martinek, Maynard Electric Steel Castings Co.; Non-Ferrous—E. H. Jagmin, Jr., Ampco Metals, Inc., and A. B. Cudnik, American Smelting & Refining Co.; Pattern—H. Wesley Stokes, Kilbourn Pattern Co., Inc., and Steve Denkinger, Atlas Plastic & Aluminum Pressure Plate Co.

Treasurer—Bradley H. Booth, Carpenter Brothers, Inc.

Ticket Sales—L. F. Krueger, Pelton Steel Castings Co., chairman, E. C. Meagher, Federal Foundry Supply Co., E. M. Sobota, Wisconsin Electric Power Co., Lloyd Quirk, Carpenter Brothers, Inc., A. F. Pfeifefer, Allis Chalmers and W. A. Mehner, Cleveland Flux.

Arrangements—H. O. Boehm, Allis Chalmers Mfg. Co., F. M. Jacobs, Standard Brass Works, R. W. Bennett, Walter Gerlinger, Inc., and Carl J. Risney, Risney Foundry Equipment Co.

Publicity—D. N. Gerlinger, Walter Gerlinger, Inc.

afs chapter meetings

APRIL

2 . . Central Indiana . . Athenaeum Turners, Indianapolis. James Smith, General Motors Corp., *"Improved Foundry Technique."*

2 . . Chicago . . Chicago Bar Association. Round Table Meeting. Malleable & Maintenance Div.—C. E. Wenninger, National Engineering Co., and K. R. Strong, Hydro Blast Corp., *"Wet and Dry Sand Reclamation."* Non-Ferrous Div.—*"Melting Fluxes and Refractories."* Pattern & Gray Iron Div.—*"Patterns for Modern Processing."* Steel Div.—E. F. Kurzinski, Linde Air Products Co., *"The Use of Oxygen for Steel Melting."*

2 . . Central Illinois . . Legion Hall, Peoria. N. A. Birch, National Bearing Div., American Brake Shoe Co., *"Brass and Bronze Foundry Practice."*

2-3 . . Metropolitan . . Essex House Hotel, Newark, New Jersey. Sand Course. Hans J. Heine, technical director, American Foundrymen's Society, O. Jay Myers, Archer-Daniels-Midland Co., and Clyde Sanders, American Colloid Co.

3 . . Rochester . . Hotel Seneca, Rochester, N. Y. Annual Pattern Night.

4 . . Toledo . . Toledo Yacht Club, Toledo, Ohio. Educational Program.

5 . . Canton District . . Mergus Restaurant, Canton, Ohio. Herbert F. Scobie, editor, MODERN CASTINGS, *"What's New With the Castings Industry."*

5 . . Saginaw Valley . . Fischer's Hotel, Frankenmuth, Michigan. Individual Group Meetings. Iron & Steel—Clyde A. Sanders, American Colloid Co., *"Foundry Sands."* Light Metals—M. F. Garwood, Chrysler Corp., *"Light Metals Application in the Automotive Field."*

5 . . St. Louis District . . York Hotel, St. Louis. Harry Gravlin, Claude B. Schneible Co., *"Why Not?"*

6 . . Philadelphia . . Steel Group—Visitation to General Steel Casting Co., Eddystone, Pa.

6 . . Central New York . . Statler Inn, Cornell University, Ithaca, New York. Dr. C. W. Mason, Cornell School of Chemical & Metallurgical Engineering, *"Solidification of Metals."*

9 . . Michiana . . Eagles Hall, Warsaw, Ind. Plant visitation. Roy J. Carver, *"The CO_2 Process."*

9 . . Northern California . . Frank Steinebach, editor, *Foundry "Outlook for the U. S. Foundry Industry."*

10 . . Twin City . . Covered Wagon, Minneapolis. Prof. T. L. Joseph, Dept. of Metallurgy, University of Minnesota, *"Taconite."*

12 . . Northeastern Ohio . . Tudor Arms Hotel, Cleveland. National Officers & Apprentice Night. Film—*"The Carbon Dioxide Process."*

13 . . Philadelphia . . Engineers' Club, Philadelphia. Round Table Meeting.

13 . . Southern California . . Rodger Young Auditorium, Los Angeles. Frank Steinebach, editor, *Foundry.*

18 . . Oregon . . Heathman Hotel, Portland. Frank Steinebach, editor, *Foundry.*

18 . . Metropolitan . . Essex House, Newark, New Jersey. S. Goldspiel, New York Naval Shipyard, *"Non-Destructive Test Methods Suitable for Foundry Use."*

18 . . Central Michigan . . Hart Hotel, Battle Creek, Michigan. T. R. Wiltse, Saginaw malleable plant, General Motors Corp., *"Controlled Pouring and the Effect on Castings."*

19 . . Detroit . . Tuller Hotel, Detroit. L. P. Robinson, Archer-Daniels-Midland Co.

20 . . Philadelphia . . Gray Iron Group—Visitation to Florence Pipe Foundry & Machine Co., Florence, New Jersey.

20 . . Birmingham District, Dinkler-Tutwiler Hotel, Birmingham, Ala. Ralph A. Clark, Electro Metallurgical Co., *"Selection of Melting Materials for Cupola Melting."*

27 . . Chesapeake . . Engineers' Club of Baltimore, Baltimore, Md. D. L. LaVelle, Federated Metals Div., American Smelting & Refining Co., *"Modern Aluminum Foundry Practices."*

27 . . Tennessee . . Patten Hotel, Chattanooga. W. A. Hambley, Charles A. Krause Milling Co., *"Casting Defects."*

27 . . Ontario . . Royal Connaught Hotel, Hamilton. Ladies Night.

30 . . Central Illinois . . Legion Hall, Peoria. Earl Woodliff, Foundry Sand Service Engineering Co., *"Foundry Sand Control for Molding and Coremaking Operations."*

MAY

1 . . Rochester . . Hotel Seneca, Rochester, N. Y. Election of Officers.

10 . . Saginaw Valley . . Fischer's Hotel, Frankenmuth, Mich. Harry Gravlin, Claude B. Schneible Co., *"New Foundry Developments."*

14 . . Chicago . . Chicago Bar Association. Convention Highlights.

15 . . Twin City . . Covered Wagon, Minneapolis. Ray Carlson, Northern Ordnance, Inc., *"Supervisory Responsibilities."*

17 . . St. Louis District . . York Hotel. Frank Steinbach, editor, *Foundry, "Can We Sell More Castings?"*

17 . . Northeastern Ohio . . Tudor Arms Hotel, Cleveland. Old Timers and Past Presidents Night.

25 . . Chesapeake . . Engineers Club of Baltimore. Know Your Local Industries Night. Speakers from several local industries.

25 . . Tennessee . . Patten Hotel, Chattanooga. Suppliers Night and Stump the Experts.

JUNE

28-29 . . 13th Annual Chapter Officers Conference of the American Foundrymen's Society. LaSalle Hotel, Chicago.

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ANALYTIC CHEMIST for malleable iron foundry laboratory. Knowledge of metallurgy desirable, but not mandatory. Well equipped laboratory, located in Western Pennsylvania. Write giving full information, personal and educational background, and salary expected. **Box C121, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

METALLURGIST for well established foundry, making malleable iron and pearlitic malleable, located in Western Pennsylvania, to be in charge of melting and a well equipped laboratory, analytical, physical, and photographic. Give personal and educational data, resume of experience, and salary desired. **Box C122, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

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with some production
experience desirable
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producer.
NUGENT SAND CO.
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FOUNDRY SERVICE ENGINEER for progressive research organization in gray iron castings field. Must have engineering training and at least five years practical foundry experience. Must be willing to travel and be interested in application of results of research to plant practice. Salary commensurate with ability. In replying give educational background, foundry experience, and brief biographical sketch. **Box C125, MODERN** graphical sketch. **Box C125, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

SALESMAN — Well established metal warehouse, handling foundry alloys, has need for a salesman to call on iron and steel foundries in Wisconsin and Minnesota. Headquarters in Milwaukee. **Address Box C111, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

FOUNDRY ASSISTANT needed by captive gray iron foundry or medium size heavy process machinery manufacturer. Young college engineer graduate preferred. Should have had some foundry experience. Is to help increase plant efficiency, planning, research and operation. Company has liberal profit sharing plan. Salary open. Location E. E. Penna. Reply Box C65, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.

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FOUNDRY SUPERINTENDENT, MANAGER: Desires responsible management position with progressive foundry. Diversified experience in all phases of foundry operation. Young, college education, ambitious, pleasing personality, works well with others. Employed at present. Proven background and can furnish excellent references. Prefers south or west but will consider other locations. Box C117, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.

FOUNDRY TECHNICIAN Aggressive technically trained foundryman wants position with foundry in need of technical "know-how". Presently employed in modern semi-production gray iron foundry as Director of Quality Control. Desires advancement to management or related field. Strong in metallurgy, sand control, gating and risering, scrap control; know modern molding and core methods; familiar with Ductile Iron, shell molding, heat-treating. Degree in Metallurgy and eight productive years foundry experience. Age 41. Box C126, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.

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A preliminary survey without charge will determine the potential savings and the cost. We Invite Your Inquiry
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WANTED TO BUY
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State size, condition, oil or gas-fired
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Foundry engineering experience desirable
Must be able to write rapidly, clearly, accurately
Job includes orginal plant writeups, rewrite, editing, some travel
State experience, education, age, salary requirements
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MODERN CASTINGS, AFS Technical Center
Golf & Wolf Roads, Des Plaines, Ill.

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is with a **HOFFMAN**

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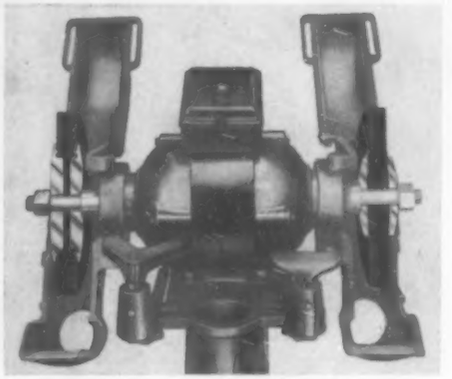

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obituaries

Bailey D. Herrington, sales engineer, Hickman, Williams & Co., Erie, Pa., passed away February 26 of a heart attack. He became associated with Hickman, Williams & Co. in 1925 and continued his education by attending

W. D. Herrington

night school at Carnegie Institute of Technology. Active in AFS activities, Mr. Herrington was a director of the Northwestern Pennsylvania Chapter at the time of his death and had served as chairman, vice-chairman, and secretary of the chapter.

W. M. Reed, 63, founder and chairman of the board of the American Air Filter Co., Inc., died at his winter home in Ft. Lauderdale, Fla., February 2, of a heart attack. Two months ago Reed moved from the presidency of the company to the newly created post of chairman of the board and retired from active direction.

Gilbert E. Kempka, 28, chief metallurgist, Johnson Motors, Waukegan, Ill., died March 3. He was formerly project assistant in the department of mining and metallurgy, University of Wisconsin. Mr. Kempka was a member of the American Foundrymen's Society and had contributed writing to MODERN CASTINGS.

Andrew D. Johnson, 69, president, Muskegon Aluminum Foundry Co. from 1927 until his retirement in 1953, passed away February 20.

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